



**DUBAI'S BUYS**  
**WILL BIG DEALS BE**  
**ON ORDER AT THIS**  
**YEAR'S SHOW?**  
**GULF SPECIAL P46**

**POWERING UP**  
737 Max 8 comes to life  
in first electrical system  
test, as Boeing moves  
towards flight debut **22**

**NEW KING RISES**  
US Marine Corps sticks  
to 2019 service plan as  
heavy-lift CH-53K takes  
to the Florida skies **32**

# FLIGHT

## INTERNATIONAL

From  Flightglobal

3-9 NOVEMBER 2015



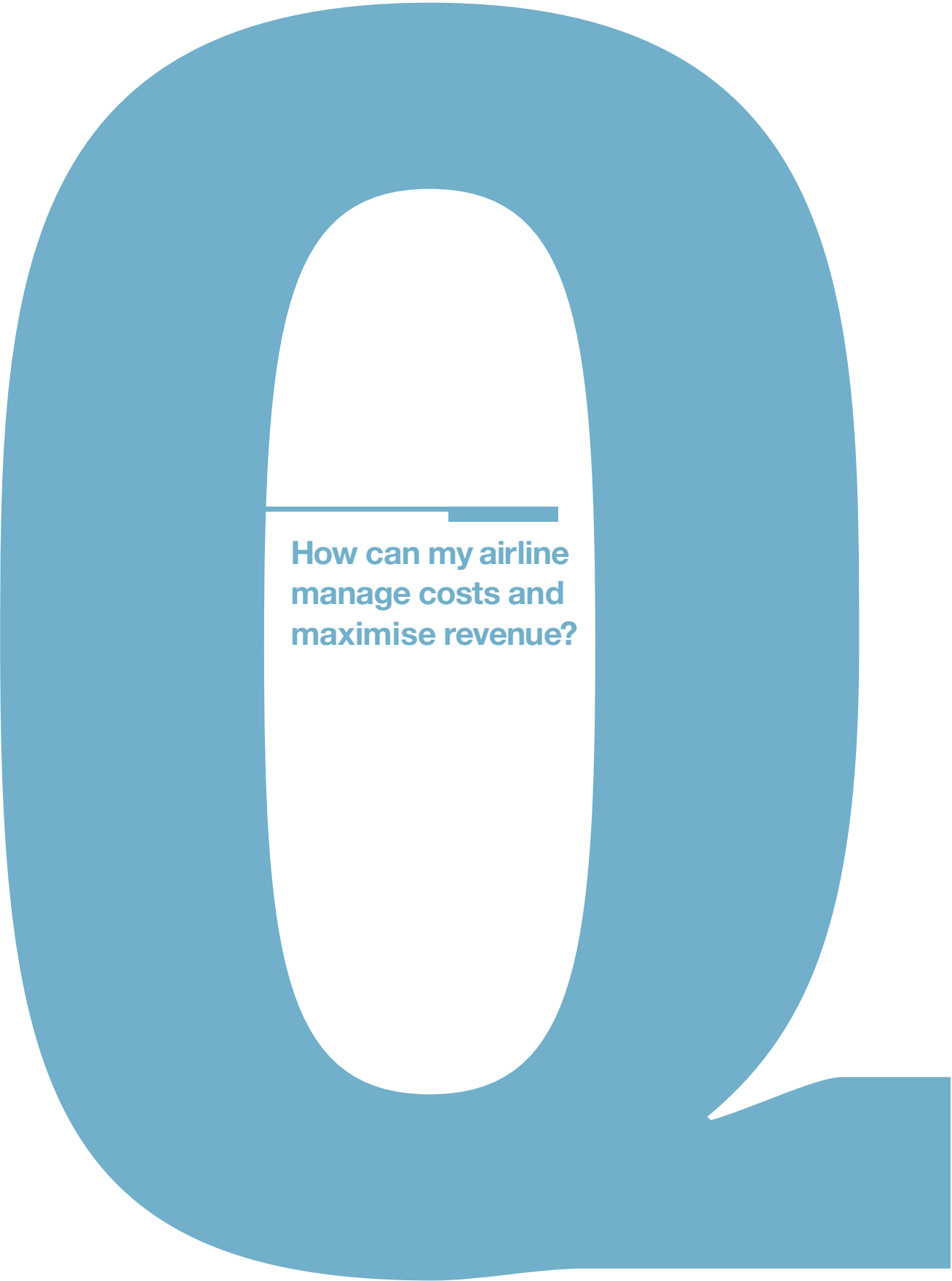
**GLOBAL STRIKE**

## STRATEGIC VICTORY


LRS-B win keeps Northrop's  
bomber credentials on target

£3.50





**How can my airline  
manage costs and  
maximise revenue?**

A low-angle, upward-looking shot of an Airbus A380-800 in flight against a bright blue sky with wispy white clouds. The aircraft is white with blue accents on the tail and engines. It is positioned diagonally across the frame, from the bottom left towards the top right. The entire image is framed within a large, stylized letter 'A' shape.

Fly the game-changing A380.  
It offers lowest costs per seat,  
highest load factors and unrivalled  
passenger appeal.

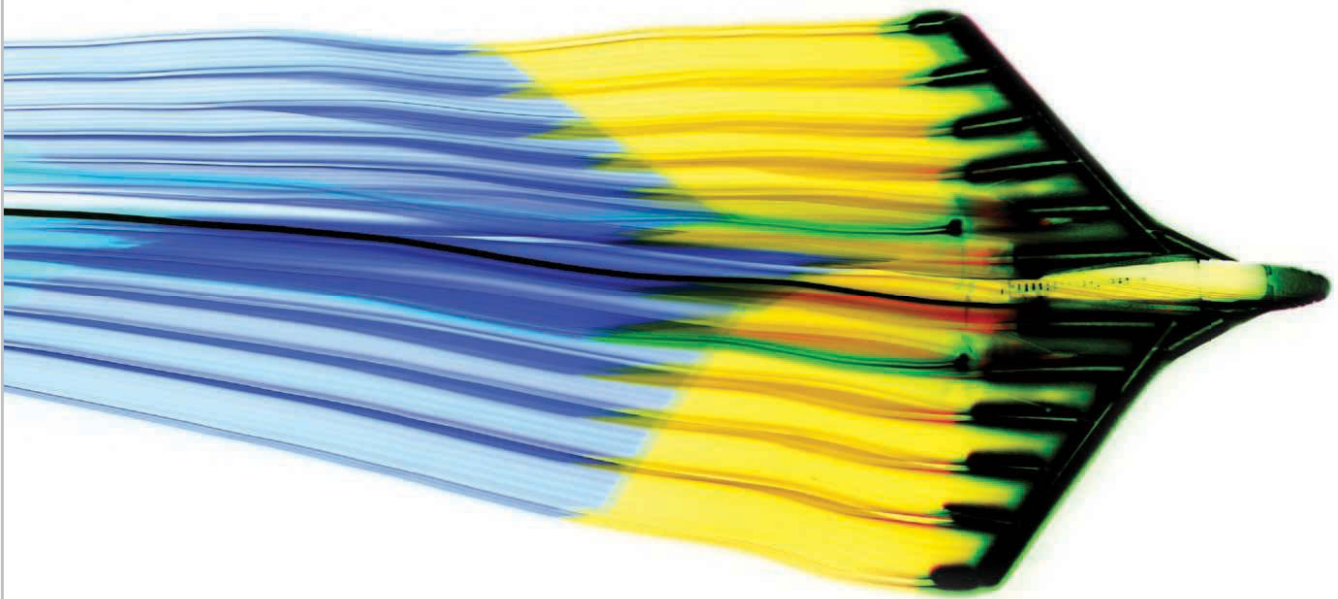
**Airbus is the answer.**



# AIR DOMINANCE

# MODERNIZATION ACROSS THE SPECTRUM.

Raytheon delivers full-spectrum air dominance. With its open systems architecture and modernized weapons, sensors and avionics, our suite of integrated solutions provides complete platform capabilities.



Raytheon enables warfighters to perform with precision across a full spectrum of solutions. Learn how.

[Raytheon.com/airdominance](http://Raytheon.com/airdominance)

Connect with us: [Twitter](#) [YouTube](#) [Facebook](#) [LinkedIn](#) [Google+](#) [Instagram](#)

## Raytheon

*Customer Success Is Our Mission*





**COVER IMAGE**

Northrop Grumman is to extend its stealth bomber heritage, with the company tasked with building a more affordable type than the US Air Force's B-2 **P10**



**BEHIND THE HEADLINES**

Organisers managed to prise **Greg Waldron** from this F-5 fighter's cockpit to report from the **ADEX show in Seoul (P37)**. For our preview of the **Dubai event**, **Murdo Morrison** headed for the **Middle East**, to assess the health of the local aerospace sector (**P46**)



**NEXT WEEK DA62 ON TEST**

Ahead of the NBAA business aviation show in Las Vegas, we survey the jets market and fly a sparkling Diamond

**NEWS**

**THIS WEEK**

- 14** Glasgow crash: questions still remain
- 15** Trent 1000s examined after Royal Brunei in-flight event.  
El Al dreams big with 787 leases
- 16** Quebec bails out CSeries as Bombardier balances books
- 17** Qatar brings data to open skies spat

**AIR TRANSPORT**

- 19** Gulf trio unlikely to buy big in Dubai
- 22** Max 8 powers up as Boeing reveals progress.  
Start for Asia's first A350 sim
- 23** Ukraine, Russia in airspace deadlock.  
Comair 737's landing gear fails at Johannesburg
- 24** Row could stall Porter CSeries deal.  
Mitsubishi Regional Jet's first flight pushed back
- 27** Sokol chosen for Il-114 production.  
Transaero troubles see Aeroflot take first 747s

**NEWS FOCUS**

- 28** Airlines secure ADS-B Out extension
- 40** UAV schemes look to go the last mile
- 45** How accident investigation is evolving

**DEFENCE**

- 31** Japan picks KC-46A for tanker top-up.  
KC-390 tests resume, defence unit revenues fall
- 32** King Stallion makes flight test debut.  
Global Hawk link key to AWACS fleet life extension
- 35** Sofia powering up MiG-29 availability.  
Heavyweight solution for F-35 ejection seat flaws
- 37** KAI to boost Surion production in 2016.  
KF-16 upgrade poised for take-off, says Lockheed

**BUSINESS AVIATION**

- 42** Rivals revive grievance over Northolt.  
Eclipse 550 pitched to China market as One Aviation looks to certification
- 44** Silvercrest schedule slips into 2017.  
Embraer revenues bolstered by business aviation



First Boeing 737 Max 8 completes power-on test **P22**

**COVER STORY**

- 10** Northrop Grumman secures the future with **LRS-B award** Losing bidders Boeing and Lockheed Martin may still challenge air force decision, however

**FEATURES**

- 46** **DUBAI SPECIAL REPORT** Spending power  
Whether in terms of military procurement, civil airliners or business aviation, the Gulf remains one of the largest markets for aerospace. The region's aviation infrastructure is expanding fast too. We set the scene for the big themes at the upcoming Dubai air show

**REGULARS**

- 9** Comment
- 65** Straight & Level
- 66** Letters
- 68** Classified
- 71** Jobs
- 75** Working Week



KAI gears up to lift KUH-1 Surion production rates **P37**. Embraer boosts its revenues by doubling deliveries **P44**



CAE offers training centres, training services, and simulation products for trainer and fighter aircraft.

Download the Military Simulator  
Census online now.  
[www.flightglobal.com/milisim](http://www.flightglobal.com/milisim)



## IMAGE OF THE WEEK

An Italian air force formation is pictured during the opening ceremony of NATO's Trident Juncture 2015 exercise on 19 October, which saw a Boeing KC-767 tanker lead two AMX ground-attack aircraft, a pair of Eurofighter Typhoons, and a trio of Panavia Tornados over Trapani air base in Sicily.

View more great aviation shots online and in our weekly tablet edition:



[flightglobal.com/](http://flightglobal.com/)  
[flight-international](http://flight-international)



Miles Uzans/NATO

## THE WEEK IN NUMBERS

↑ **23%**

B/E Aerospace

Rise in Q3 business jet sales, to \$172m, at cabins maker B/E Aerospace; commercial jets dipped 1.2%, to \$507m

€**3333m**

MTU Aero Engines

At MTU, nine-month profits rose 23% on revenue up 16% to €3.3bn (\$3.6bn), with a "tailwind" off the strong US dollar

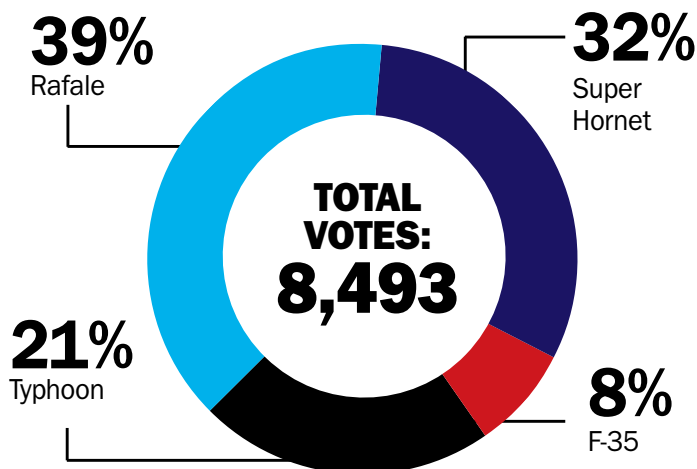
↑ **154**

Flightglobal dashboard

Number of aircraft Indian low-cost carrier IndiGo expects to be operating by March 2018 – up from 111 next year

## QUESTION OF THE WEEK

Last week, we asked: **Which fighter should Canada buy?** You said:



This week, we ask: **What are you expecting from the Dubai air show?**

- ☐ At least one major programme launch  
☐ Blockbuster airline orders ☐ Both ☐ Neither

Vote at [flightglobal.com](http://flightglobal.com)



dashboard

Flightglobal's premium news and data service delivers breaking air transport stories with profiles, schedules, and fleet, financial and traffic information [flightglobal.com/dashboard](http://flightglobal.com/dashboard)

**Download the latest Commercial Engines Report**  
now with further enhanced data and in-depth market analysis

[flightglobal.com/commengines](http://flightglobal.com/commengines)



The Power of Flight





PROVEN PERFORMER

Fly nonstop across oceans (up to 4,750 nm/8,800 km); fly one-stop to almost anywhere in the world. The 900LX has unrivaled capability, flying in and out of impressively short fields, burning 40 percent less fuel than its nearest competitor, and offering the comfort factor of three engines. It's the latest and the best in the iconic Falcon 900 series.

**Falcon 900LX**

[WWW.DASSAULTFALCON.COM](http://WWW.DASSAULTFALCON.COM) | FRANCE: +33 1 47 11 88 68 | USA: +1 201 541 4600

**DASSAULT  
FALCON**

ENGINEERED WITH PASSION





**ALERT  
LOCALIZATION  
RESCUE**

BREITLING  
**EMERGENCY**

IN THE HEAT OF ACTION, THERE ARE THOSE WHO TRUST THEIR LUCKY STAR – AND THOSE WHO PREFER THE EMERGENCY, THE WORLD'S FIRST WRISTWATCH WITH BUILT-IN PERSONAL LOCATOR BEACON.

Equipped with a dual frequency micro-transmitter, this high-tech survival instrument serves to trigger search and rescue operations in all emergency situations – on land, at sea or in the air. The first ever personal locator beacon designed for wrist wear, meaning literally on you at all times, it shares your feats around the globe while guaranteeing maximum safety. Breitling Emergency: the watch that can save your life.



**BREITLING.COM**

INSTRUMENTS FOR PROFESSIONALS™

# LRS-B or bust

It has been a long time coming, but the US Air Force has finally picked the manufacturer for its next-generation strategic bomber. But with the B-52 showing its age, time is not on its side

**T**he B-52 is going to fall apart on us before we can get a replacement for it."

Gen Curtis LeMay, the legendary cigar-chomping US Air Force (USAF) chief of staff, made that ill-timed prophecy in 1964, only nine years after Boeing's eight-engined strategic bomber entered service.

However, the spiritual father of Strategic Air Command would no doubt be surprised to learn that even 51 years later, his rather pessimistic prediction had still not yet come to pass.

But so it was after months – or even decades – of waiting, the USAF on 27 October finally selected Northrop Grumman to develop and deliver the stealth bomber that would eventually replace the Boeing B-52 and Rockwell B-1.

Some might detect faint echoes of the air force's then-secret decision to select Northrop to build the B-2, the bomber originally intended to replace the B-52. Lockheed was on the losing end of both programmes,

## As the victor, Northrop may yet face the tougher challenge – keeping the new bomber sold

first when its Senior Peg design lost in 1981 and then as a subcontractor to Boeing for the current Long Range Strike Bomber (LRS-B) programme.

The contract protest process was available in 1981, but Lockheed never seriously considered it. Times have changed in the defence business though. Opportunities to win new programmes are scarce. Boeing now faces being shut out of the combat-aircraft business altogether, unless it wins the T-X trainer contest and manages to eke out F/A-18E/F production.



"We're still flying the B-52?"

As the victor, Northrop may yet face the tougher challenge – keeping LRS-B sold. The B-2, of course, was originally intended to replace the B-52 fleet, but cost overruns and schedule delays, combined with changing priorities and budget cutbacks, reduced the programme to 21 aircraft.

Commercial aviation is so safe that fatal accidents occur only when a set of unusual circumstances combine in one moment. It seems the opposite effect holds true in military acquisitions, when programmes are successful only in random combinations of lucky events.

The USAF must keep its requirements steady and budget on track, despite evolving needs and a looming modernisation shortfall. Northrop, meanwhile, must keep costs down and schedules tight, knowing there will be failed tests and technical surprises. Congress is like a legislative fifth column – a risk to be managed.

But it is worth noting that the B-52 has no more time to spare. If LRS-B fails, LeMay's 51-year-old warning might actually come true. ■

**See This Week P10-11**

## No margin left for error

**B**ombardier's management team has come to terms with the business sins of a string of predecessors.

As a result, nearly half of the CSeries programme now belongs to the government of Quebec. The Learjet 85, meanwhile, now lies in the dustbin of aerospace history, a \$2.6 billion mistake Bombardier could ill-afford.

But has new chief executive Alain Bellemare's nine-month house cleaning gone far enough?

The CSeries programme now has the financial backing it needs to carry the programme to full-rate production in five years, Bellemare says. But there is no further margin for error. Both Airbus and Boeing have paid dearly in recent years for releasing new aircraft before all their systems and suppliers were ready.

Bombardier cannot afford for that to happen on the CSeries. Its supply chain must be ready and prepared to keep parts flowing into the Mirabel final-assembly line on time. And all of the CSeries systems must prove to be as safe and reliable in service as any mature commercial aircraft, or face the consequences of increased regulatory scrutiny.

Bombardier is in no position to absorb the production system breakdowns, in-service groundings and other follies experienced by their much larger competitors in recent years.

Is the CSeries – and Bombardier – ready for the task? Only Bellemare's team knows the answer. ■

**See This Week P16**



Stay on top of the latest news and analysis of the global aerospace industry at: [flightglobal.com/news](http://flightglobal.com/news)



COMPETITION JAMES DREW WASHINGTON DC

# Northrop Grumman secures the future with LRS-B award

Losing bidders Boeing and Lockheed Martin may still challenge air force decision, however

**N**orthrop Grumman scored an against-the-odds victory over a Boeing and Lockheed Martin team on 27 October, when it was endowed with the US Air Force's \$80 billion programme to build 100 next-generation bombers.

The company that ushered in the stealthy, flying-wing bomber era with its B-2 Spirit is now gearing up to deliver another generational leap in low-observable, penetrating combat aircraft technology – perhaps not at the same “bleeding edge” of the technological envelope, but rather a collection of mature systems in an airframe package that is already dubbed “B-3” by commentators.

“Building this bomber is a strategic investment in the next 50 years,” says US defence secretary Ash Carter. “It demonstrates our commitment to our allies, and our determination to potential adversaries – making it crystal clear that the US will continue to retain the ability to project power throughout the globe long into the future.”

The Long-Range Strike Bomber (LRS-B) award includes funding for an undisclosed number of engineering and manufacturing development (EMD) test aircraft, plus five options for the first 21 of an expected 100-aircraft production run, at \$564 million each in today's dollars.

Up until air force secretary

Deborah Lee James announced the contract winner at the Pentagon, pundits were favouring a Boeing/Lockheed win by 60:40, according to defence industry analyst Jim McAleese. On the night of the announcement, he reported Northrop stocks as jumping 11.5% in after-hours trading, while those of Boeing and Lockheed fell by 2.4% and 3% respectively.

## “Northrop's victory in the bomber competition is a stunning upset”

**LOREN THOMPSON**  
Lexington Institute

The air force managed to keep its source-selection of the decade under wraps until the final moment, with one line in the Department of Defense's daily contracts notice listing Northrop as the winner. No contract price or period of performance was included.

Some had thought that Boeing and Lockheed's combined wealth would overwhelm Northrop, and statements by Lockheed in the run-up to the decision suggested that the joint team had bid aggressively on cost.

“Northrop's victory in the bomber competition is a stunning upset, that demonstrates an un-

derdog can still beat the best-endowed team in the industry,” says Loren Thompson of the Lexington Institute. “This completely changes the business outlook for Northrop, and makes it look like a far more resilient company with a bright future.”

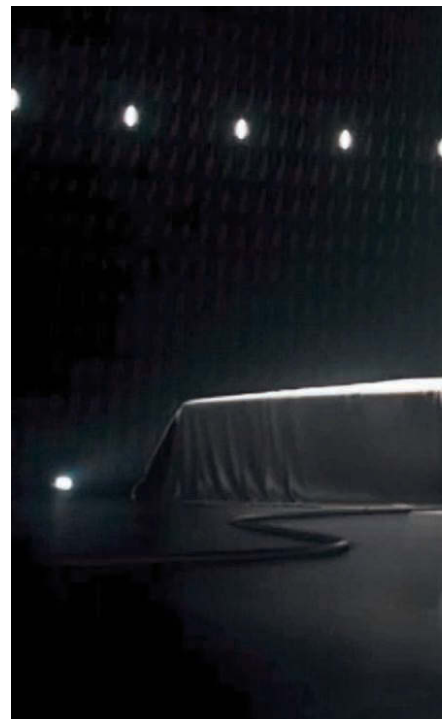
There were clearly cheers from Falls Church in Virginia to Palmdale in California on Northrop's side, and many thousands of sombre faces in Marietta, Georgia for Lockheed and in St Louis, Missouri – where Boeing is struggling to keep its combat fighter business alive.

Lockheed's F-35 programme produces 20% of the company's corporate revenue, and Northrop now has the bomber to keep its balance sheet healthy into the next decade, if things go as planned. But Boeing must now fight doubly hard to book F/A-18E/F Super Hornet, EA-18G Growler and F-15SE orders, and to also win the USAF's \$12 billion T-X next-generation trainer programme if wants to continue in the advanced fighter business that it inherited from McDonnell Douglas.

The alternative outcome might have been more awkward, however, with Richard Aboulafia of the Teal Group believing that Northrop could have been split up and auctioned off in pieces had it not been successful with its LRS-B bid.

“If [the US] industrial base were a factor, they have to choose between losing one of their two stealth aircraft designers or one of two major combat aircraft manufacturers,” he says. “Does Boeing go back to being pre-McDonnell Douglas and pre-Rockwell – an almost pure-play commercial aircraft company with some defence business, as it was in 1997? Or do they buy Northrop's aerospace unit, solving all their problems?”

It is too early to tell for sure,



but McAleese does not foresee any knee-jerk mergers or acquisitions for Boeing as being on the horizon just yet.

Wayne Plucker of Frost & Sullivan says that despite the industrial concerns for Boeing, the Northrop win makes “an overall happier industry than it would be the other way”.

## COMPETITION

“It's a good message for Northrop, who doesn't have a big market presence,” Plucker says. “They're doing nooks and crannies, but overall it's a big deal for them. Their suppliers could use the work.”

The losing team could still choose to challenge the award by filing a bid protest with the US Government Accountability Office, subjecting the programme to a 100-day waiting period while the congressional watchdog completes its assessment. With such a large contract at stake, it is no surprise that Boeing and Lockheed are already considering their next move.

“We are interested in knowing how the competition was scored in terms of price and risk, as we believe that the combination of Boeing and Lockheed Martin offers unparalleled experience, capability and resources for this



Zuma/Rea Shutterstock

Only 21 examples of the earlier B-2 bomber were ever built





**Glasgow crash:  
questions still  
remain**  
**THIS WEEK P14**



**Almost everything about  
the future stealthy bomber  
is still veiled in secrecy**

Northrop Grumman

critically important recapitalisation program,” the companies said in a joint statement.

Air force military deputy for acquisition Lt Gen Arnold Bunch says a standard post-award debriefing could occur as soon as 30 October if the losing side requests it. “We’ll monitor and we won’t stipulate or make any assumptions as to what the ramifications of that [potential bid protest] would be,” Bunch says.

Rebecca Grant of IRIS Research thinks Northrop would have remained intact with or without LRS-B, although its status as a top-tier military aircraft manufacturer would have been diminished.

The company would still have been engaged in fighter manufacturing, producing centre fuselages for Lockheed’s F-35 and 40% of the Super Hornet. It also has the US Navy’s E-2D Hawkeye and MQ-4C Triton programmes, giving it substantial expertise in the communications, command-and-control and unmanned systems space. And since the new bomber will be an optionally-manned aircraft with all-aspect stealth, Northrop’s X-47B and classified “XX-180” projects are probably more significant technologically.

“There was concern about the atrophy of skills, but I think the bomber has already done a great

service in exercising two design teams to bring a design not only to the paper stage, but all the way up to preliminary design review,” says Grant. “It has already given a great shot of adrenaline to the industrial base. That will have elevated the skill sets for both competitors and all three companies.”

### **“LRS-B will allow the air force to operate in tomorrow’s high-end, aerial-denial threat environment”**

**DEBORAH LEE JAMES**  
Secretary of the Air Force

Very little new information except for the winner and cost estimates were revealed during the LRS-B announcement, and almost everything else about the programme is veiled in secrecy.

The USAF is especially guarding any information related to performance, suppliers and specific time lines, except saying that the bomber will achieve initial operational capability in the “mid-2020s”.

It is unclear how many engines the winning bomber will have, but advances in engine reliability and performance since the B-2

makes a twin- or tri-engined bomber more attractive in terms of reduced cost and complexity. But thrust, low-observable characteristics and engine failures must all be factored into the design.

Pratt & Whitney, which along with rival General Electric would be candidates to power the new bomber, congratulated Northrop on its selection, but declines to comment about the bomber programme. P&W could potentially offer a version of the gearless, 30,000lb-thrust (133kN) PW9000 that was revealed in 2010, or perhaps even a derivative of the F135 engine used on the F-35.

The air force says its new bomber has been designed with three critical points in mind.

Firstly, it must operate as a family of systems, communicating and working seamlessly with assets from the army, navy and marine corps, as well as new weapons, sensors and communications gear.

Secondly, it must conform with the service’s recently defined open mission system (OMS) architecture standards, so that new systems and hardware can be easily integrated through future upgrades. Grant says this concept has been tried many times to no avail, but “they’ve convinced me” this time around

with recent demonstrations on both sides. Northrop recently showed OMS standards on the B-2, while Lockheed customised the U-2 surveillance aircraft using the same criteria.

The third and perhaps most influential design parameter is cost: \$606 million per aircraft. The USAF says the \$564 million unit cost for a 100-aircraft production run was reached using independent government cost estimates. The estimated development cost is \$23.5 billion, including the undisclosed number of test articles. More than \$1.9 billion already has been apportioned to the programme since it started in 2011, service officials say.

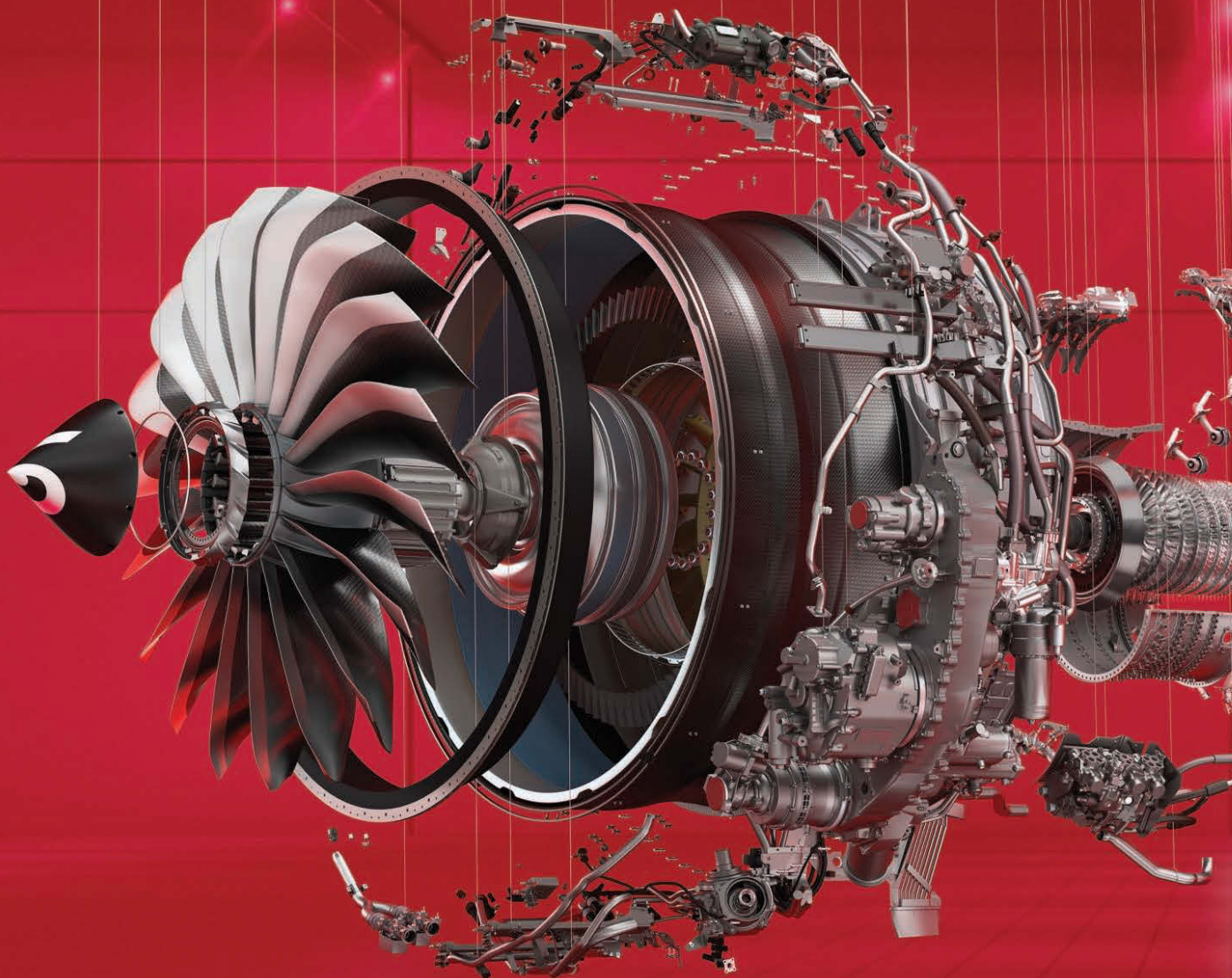
### **CAPACITY**

The award to Northrop includes options for the first 21 low-rate production aircraft, and Mark Gunzinger of the Center for Strategic and Budgetary Assessments wants to see production ramp up as quickly as possible to fill the USA’s “long-range strike gap”. He points out that today’s small B-2 fleet can generate just 12 to 13 sorties per day at best, and that an “all-aspect stealth” bomber is critically needed to boost those numbers and keep ahead of Russia and China.

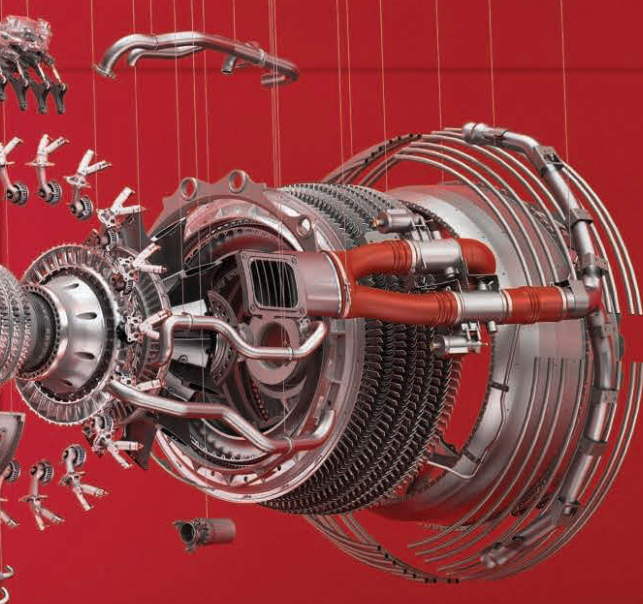
“To the extent we delay boosting that capacity, we’re assuming a lot of risk,” he says. “If we lose our ability to hit any target in the world when needed and directed by the president, we lose something as a superpower. It’s not surprising Russia and China aspire to have that kind of capability.”

James cautions that “potential adversaries” have observed US airpower over the past 25 years and are fielding advanced air defence systems and more capable surface-to-air missiles as a result, keeping the non-stealthy, 50-year-old B-52 and 27-year-old Boeing B-1B at arm’s length.

“LRS-B will allow the air force to operate in tomorrow’s high-end, anti-access, aerial-denial threat environment,” says James. “It will also give us the flexibility and the capability to launch from the continental United States air strikes that would be able to strike any location in the world.” ■







# The architecture of reliability

Our next-generation LEAP engine is built on solid foundations. Drawing on the legendary architecture of the CFM56, we have expanded our technology and innovation even further. Delivering a new standard in fuel efficiency for CFM customers worldwide.

**[cfmaeroengines.com](http://cfmaeroengines.com)**

CFM International is a 50/50 joint company between Snecma (Safran) and GE.

**PERFORMANCE | EXECUTION | TECHNOLOGY**

**LEAP**

**MORE TO BELIEVE IN**

INVESTIGATION CRAIG HOYLE LONDON

# Glasgow crash: questions still remain

AAIB unable to determine why EC135's reserve fuel pumps were turned off, or why pilot did not follow emergency procedures

**A**ccident investigators have been unable to fully determine why an Airbus Helicopters EC135 T2+, which had been supporting Police Scotland operations in Glasgow on 19 November 2013, experienced dual engine flame-outs and crashed, killing 10 people.

In a report published on 23 October, the UK Air Accidents Investigation Branch (AAIB) says no answers have been found to explain why the pilot had switched off reserve pumps earlier in the flight and also failed to respond as required after acknowledging repeated low fuel warnings.

"The helicopter did not land within the 10-minute period specified in the pilot's checklist emergency and malfunction procedures, following continuous activation of the low fuel warnings," it confirms.

Owned and operated by Bond Air Services, the aircraft – G-SPAO – was on its way back to Glasgow City Heliport, but came down while still 2.7nm (5km) away, after being airborne for 1h 38min. "Both engines flamed out due to fuel starvation, about 32 seconds apart," the report says.

The aircraft crashed through the roof of the Clutha Vaults public house, killing its civilian pilot, two onboard police observers and seven civilians on the ground, as well as seriously injuring 11 others.

"It was not possible to determine why both fuel transfer pumps in the main tank re-



Ten people were killed when the Police support helicopter came down on the roof of a public house

mained off during the latter part of the flight, why the helicopter did not land within the time specified following activation of the low fuel warnings and why a Mayday call was not received from the pilot," the report states.

"Also, it was not possible to establish why a more successful autorotation and landing was not achieved." However, the aircraft's radar altimeter and landing light were left unpowered following the loss of the second engine, which the AAIB says resulted in "a loss of height information and reduced visual cues".

"No significant pre-impact technical defect was identified in any part of the aircraft," the investigation says, and "neither [Turbomeca Arrius 2B2] engine showed any evidence of pre-acci-

dent damage, fault or failure."

The aircraft had taken off with about 400kg (880lb) of fuel, and 73kg of this remained on board.

Referring to the challenges faced in obtaining flight information, the AAIB says: "It is recommended that the [UK] Civil Aviation Authority requires all helicopters operating under a Police air operators certificate, and first issued with an individual certificate of airworthiness before 1 January 2018, to be equipped with a recording capability that captures data, audio and images in crash-survivable memory."

The AAIB is also calling for the European Aviation Safety Agency to require the same enhancements for helicopter emergency medical services operators.

"We will continue to work tire-

lessly to ensure the safety of our aircraft," says Airbus Helicopters, adding that it "worked to provide the authorities with all information and support required."

Airbus Helicopters' global head of safety, Gilles Bruniaux, notes that the manufacturer has installed the Vision 1000 system – which records cockpit imagery and voice activity, along with certain flight parameters – as standard equipment into all its commercial rotorcraft ordered since the start of 2014. The company also is looking at automating the system used to transfer fuel from reserve tanks, he notes.

Bond Air Services says it is "studying the report and will continue to work with others to learn from its findings". ■

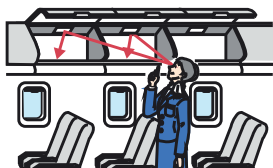
See News Focus P45

the first in the world!!

Wide field of view with flat surface

KomyMirror<sup>PAT.</sup>

Passenger Convenience



Shorten Aircraft Turns



Cost Savings!!

Saving  
Non Productive Hour



Komy Co., Ltd.

[www.komy.com](http://www.komy.com)





Quebec steps  
in as Bombardier  
balances books  
**THIS WEEK P16**

**THIS WEEK**

**INCIDENT** MICHAEL GUBISCH LONDON

# Trent 1000s examined after Royal Brunei in-flight event

Detailed inspections by R-R of affected engines reveals blade damage to both powerplants

**R**oyal Brunei Airlines is inspecting the Rolls-Royce Trent 1000 engines powering its Boeing 787 fleet after an in-flight shutdown in mid-October.

The incident happened “just after take-off” of a scheduled flight from Manila to the carrier’s base at Brunei International airport on 21 October. The airline says the pilots shut down one engine “in accordance with normal procedures” and returned to the Philippine capital where the aircraft landed without incident.

R-R conducted detailed bore-scope inspections on both engines, while a spare Trent 1000 was shipped to Brunei as replacement for the affected powerplant.

Royal Brunei says the engine manufacturer discovered damage, similar to that found in the affected engine, to a number of blades in the aircraft’s other powerplant.

“At this point, there is no evidence that an external event, such as



The incident occurred shortly after take-off from Manila airport

a bird strike, has caused this damage to both engines,” says the carrier.

While R-R’s investigation continues, the airline has decided, together with Brunei’s civil aviation authority, to inspect all engines on all four of its 787s.

R-R says it will “evaluate the best way to return Royal Brunei to service” after its analysis.

Other Trent 1000 operators “are being informed of the situation”, adds the UK engine maker.

Flightglobal’s Fleets Analyzer database records that of the 309 787s currently in service, 208 are powered by Trent 1000s. In addition, R-R engines have been selected to power 257 of the Dreamliners in Boeing’s backlog. ■

**FLEET**

DAVID KAMINSKI-MORROW LONDON

## El Al dreams big with 787 leases

**I**sraeli flag-carrier El Al is to lease at least six of the 15 Boeing 787s it is taking to replace its long-haul fleet.

The airline has agreed to order up to nine 787s from Boeing, says the airframer, following its selection of the type earlier this year.

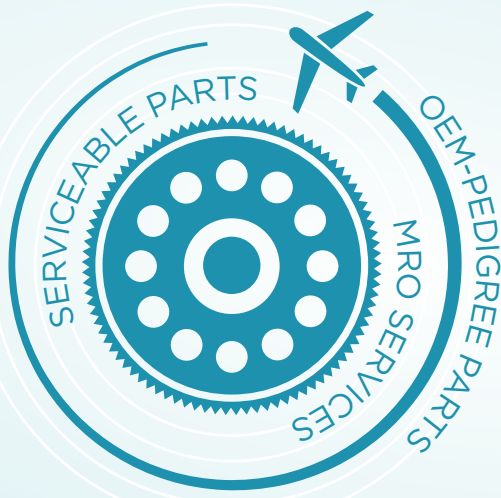
El Al states that the nine comprise five 787-8s and four 787-9s. Boeing says that three of these will be included on its backlog data from early November, with the others added as their contracts are finalised. Six other 787s will be sourced from independent lessors, the airframer adds.

El Al says it will take four 787-9s and two 787-8s on 12-year leases, and has signed memoranda of understanding with three lessors.

It adds that the Boeing agreement includes an option to acquire seven of the larger 787-10, if deliveries take place by 2023.

The airline confirms it is in exclusive talks with Rolls-Royce to purchase Trent 1000 engines for the type – a substantial shift for El Al, whose 747 and 767 fleets are Pratt & Whitney-powered. ■

## NEED LEGACY AIRCRAFT SUPPORT? ONTIC IS YOUR ANSWER.



### ONTIC'S EXTENDED LIFE SOLUTIONS WILL KEEP YOUR FLEET FLYING

Comprehensive maintenance solutions for Commercial, Rotorcraft, Business Aviation and Military Aircraft

Visit [Ontic.com](http://Ontic.com) or  
Call +44 (0) 333-240-8600  
for more information



PROGRAMME STEPHEN TRIMBLE WASHINGTON DC

# Quebec bails out CSeries as Bombardier balances books

Airframer reshapes finances of development programme, including \$3.2 billion write-down

**B**ombardier is to initiate a financial overhaul of the CSeries programme, with its latest plan including a \$3.2 billion write-down on the development of the new twinjet, while pushing out the unit break-even milestone to 2020.

But the Canadian airframer will need to inject \$3 billion over the next five years into the CSeries before it can contribute positively to the balance sheet, said Bombardier chief financial officer John Di Bert in a third-quarter earnings call on 29 October.

The first \$1 billion of that will come next year in the form of two \$500 million instalments from the Quebec government. In return, the provincial administration will receive a 49.5% stake in a new company that will manage the CSeries programme, with Bombardier holding the remainder.

Bombardier plans to spend another \$1 billion from cash flow as CSeries production begins to ramp-up in 2016, Di Bert says.

The remaining \$1 billion will be contributed by Bombardier over the next four years as the CSeries reaches full-rate production in 2020 or 2021, he says.

With Quebec providing a third of the finance needed, Bombardier's planned \$2 billion investment could come from a variety of internal sources, Di Bert says.

The company plans to end this financial year with \$5 billion in cash and revolving credit. The company also expects to raise \$6 billion with an initial public offering of a minority stake in the Bombardier Transportation train manufacturing business, he says.

The financial reshuffling on CSeries is intended to clear away any remaining monetary obstacles to continuing the programme after a 2.5-year delay to reach entry into service. But with only 243 firm orders, the break-even milestone in 2020 now seems to extend beyond the company's current backlog, so Bombardier's sales teams must bring in new customers.

Bombardier plans to begin the ramp-up next year with 15-20 aircraft deliveries, says chief executive Alain Bellemare.

Bellemare does not offer a ramp-up forecast beyond 2016, but a previous Bombardier management team had expected to reach full-rate production of 120 aircraft within three years of entry into service.

The CSeries programme has not booked a new firm order in more than a year, but Bellemare says that interest in the small narrowbody remains high.

The CSeries remains the only clean-sheet design in the 100-150 market segment. Bombardier says airworthiness certification by Transport Canada is "imminent", with the CS100 reporting improved fuel burn, range and payload performance.

"We knew there were going to be significant challenges with stepping our game up," Bellemare says. "There's more to come, but we are at the right place." ■

## BOMBARDIER IN NUMBERS

# 243

Total orders for CSeries

# \$4.9bn

Third quarter net loss

# \$5.8bn

Combined total write-down on CSeries and Learjet 85

# \$1bn

Quebec government's investment in CSeries programme

BUSINESS AIRCRAFT STEPHEN TRIMBLE WASHINGTON DC

## Airframer takes \$2.6bn hit as long-delayed Learjet 85 is formally cancelled

Bombardier has formally cancelled the Learjet 85 programme with a \$1.2 billion write-down 10 months after placing the programme on an indefinite pause, citing market weakness in the midsize segment for business jets.

The decision announced on 29 October raises Bombardier's overall loss on the composite-skinned Learjet 85 to \$2.6 billion. It also leaves the Wichita, Kansas-based Learjet division with no new products in development.

Bombardier chief executive Alain Bellemare says he remains committed to the Learjet family of light and super-light business jets, but also does not rule out further changes within the airframer's overall portfolio.

"We will continue to look at how we further optimise the business. It's never finished," Bellemare says.

The Learjet 85 was supposed to enter service in 2012, but was delayed by more than two years before Bombardier announced the

programme would be "paused" earlier this year. In 2013, Bombardier acknowledged unspecified issues with certifying the composite structure of the aircraft, but said these had been resolved with the US Federal Aviation Administration.

Bellemare blames the programme's delays on an "overwhelmed" company attempting to manage three new clean-sheet aircraft developments alongside a number of upgrade projects for existing types.

Bombardier also introduced the re-engined and updated Learjet 70 and 75 models last year, which remain the business aviation division's only products in active production.

Meanwhile, Bombardier has installed the first GE Aviation Passport engines on the Global 7000 business jet, which is being prepared to enter flight test. A ground testing rig has been commissioned to validate the flight control software and systems needed to begin the flight-test campaign. ■



The composite-skinned jet was supposed to enter service in 2012





**Gulf trio unlikely to buy big in Dubai**  
**AIR TRANSPORT P19**

**DISPUTE** MAX KINGSLEY-JONES LONDON

# Qatar brings data to open skies spat

Airline chief Akbar Al Baker accuses European carriers of colluding with US counterparts to impede Gulf trio's expansion

**Q**atar Airways believes rival European network carriers have asked their US partners to complain about the Gulf airlines in the dispute over open skies.

The Doha-based airline's group chief executive Akbar Al Baker accuses Star Alliance member Lufthansa and SkyTeam's Air France-KLM of trying to impede the progress in Europe of Qatar Airways, and of Emirates and Etihad Airways, "because they cannot stand up to competition".

"American carriers are lobbied by the Lufthansa/Air France-KLM grouping, while they have anti-trust immunity over the Atlantic by which they can fix prices, detrimental to the interest of passengers," says Al Baker.

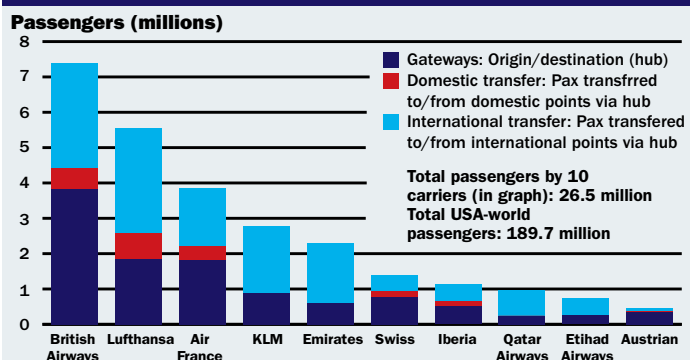
Al Baker dismisses rivals' complaints that the Gulf airlines are "fifth- and sixth-freedom carriers", saying this is also true of European airlines. Data provided by Qatar Airways compiled from IATA's PaxIS database shows that on USA-world routes in 2014, over half of Lufthansa and Air France-KLM traffic was transferring to an international destination.

The data shows that almost three million of the 5.6 million passengers Lufthansa carried to/from the USA in 2014 were transiting to an international destination, while Air France-KLM moved 3.5 million of their combined 6.6 million USA-world passengers to an international point over their gateway hubs.

However, the data does not show how many of these international transit passengers were connecting to another point within the European single aviation mar-

ket. It is also based on returns from the IATA BSP clearing house, so it only shows travel-trade bookings and may exaggerate the share of connecting traffic. ■

## PASSENGER FLOW DISTRIBUTION: USA-WORLD



SOURCE: IATA PaxIS (via Qatar Airways)

NOTE: Data for Jan-Dec 2014 (non-directional passengers)



Corporate and private aircraft maintenance, refurbishment and completion services.  
Located at Basel EuroAirport in Switzerland.

**AMAC AEROSPACE**

AMAC Aerospace Switzerland AG Telephone +41 58 310 31 31  
Henric Petri-Strasse 35 info@amacaerospace.com  
4051 Basel, Switzerland www.amacaerospace.com

# A never-ending story.



Lufthansa Technik is synonymous with innovation. Thanks to creative engineering work and cutting-edge research facilities, we constantly set new standards. Alongside the continuous further development of maintenance, repair, and overhaul procedures, we develop new technologies, cabin products, and servicing processes for aviation. Always striving for the highest quality and safety standards, we are able to guarantee technological excellence.

Lufthansa Technik AG, [marketing.sales@lht.dlh.de](mailto:marketing.sales@lht.dlh.de)  
Call us: +49-40-5070-5553



[www.lufthansa-technik.com/innovation](http://www.lufthansa-technik.com/innovation)



**Lufthansa Technik**  
More mobility for the world



Max 8 powers up  
as Boeing shows  
production progress  
**AIR TRANSPORT P22**

**AIR SHOW** MAX KINGSLEY-JONES & MURDO MORRISON LONDON

# Gulf trio unlikely to buy big in Dubai

As the carriers mull next stages of their fleet strategies, the massive orders of two years ago are unlikely to be repeated

**T**his year's Dubai will almost certainly not see a repeat of the orders bonanza that made 2013 one of the most prolific shows, as the big three carriers bed in new aircraft and assess the next steps in their fleet strategies.

Two years ago, Emirates, Etihad Airways and Qatar Airways between them placed commitments for more than 450 aircraft – a mix of launch orders for the Boeing 777X along with deals for 787s and Airbus A380s, A320s and A350s. But such a large sales tally looks unlikely in 2015.

Local carrier Emirates can usually be relied on to deliver some big orders at the event. But the signs are that the show may come too soon for two potential deals the airline is negotiating.

The Dubai airline has been a strong proponent of the A380 and would buy a re-engined version should Airbus decide to create one. But the airline's president Sir Tim Clark rules out a commitment

**"If [Airbus] does develop [a re-engined A380], it would be of interest to everybody"**

**SIR TIM CLARK**  
President, Emirates



**Emirates was among the large spenders in 2013 with a launch commitment for the Boeing 777X**

at the show for more A380s as he thinks it unlikely Airbus will be ready to launch at the air show.

"If [Airbus] does develop it, it would be of interest to everybody, and I'd like to see them sell more A380s," he says. Clark also talks down another potential Dubai deal, saying the airline will not choose between the Airbus A350-900 and the Boeing 787-10 until next year. "It will be in 2016 – but when, I don't know – and it will be one or the other," he adds.

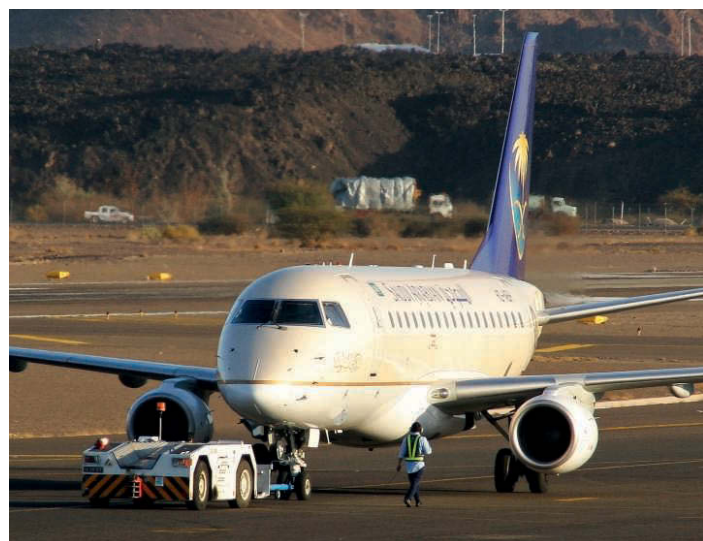
Qatar Airways is also never slow in coming forward during

the big air shows to place orders, but the airline's group chief executive Akbar Al Baker says he has no deals in the offing and expects Dubai to be quiet by comparison with previous events.

Etihad Airways was another big spender at Dubai two years ago – signing for 25 Boeing 777Xs, 30 Boeing 787-10s and one 777 Freighter along with 50 A350s, 36 A320neos and an A330-200 Freighter. But chief executive James Hogan has no plans to order more aircraft at the forthcoming show.

"We have the order book of aircraft that we need and over that period of time we have the capability to feed those aircraft not only into Alitalia, but into Air Berlin and Air Serbia," Hogan says.

One exception might be Saudia. In an interview with Bloomberg, chief executive Abdul Mohsen Jonaïd says the state-owned carrier is looking at replacing its four Boeing 747s with A380s and adding 777s or 777Xs, and states that a show order is possible. ■



**The carrier's regional jets will be replaced by Airbus A320s**

**FLEET OLIVIER BONNASSIES LONDON**

## Saudia to axe all its Embraer 170s

Saudia is set to retire its entire Embraer 170 fleet after 10 years of service, as the carrier receives more Airbus A320s.

Director general Saleh bin Nasser Al-Jasser confirms that a total of 15 E170s will come out of service next year along with four Boeing 747s.

Saudia placed an order for 15 E170s in April 2005, for domestic and Gulf services.

Deliveries started in December that year and stretched until March 2007. Saudia's E170 fleet is configured with two-class 66-seat cabins.

The carrier's 747 passenger fleet

includes one stored 747SP along with 14 747-400s operated under sub- and wet-lease contracts, Flightglobal's Fleets Analyzer database shows. Saudia also owns three 747-400s.

A long-time Boeing customer, Saudia placed its first order with Airbus in more than 30 years in 2007 – for 22 A320-family aircraft. In July 2008, it ordered eight A330-300s, and another four were firmed in 2010.

More recently, Airbus announced the Saudi flag carrier as the launch customer for the A330 regional variant, with an order for 20 aircraft. ■



[www.rolls-royce.com/futuretechnology](http://www.rolls-royce.com/futuretechnology)



**We deliver the best  
jet engines in the world**



The story continues...

# We're working on technology today that will fly his kids around the world.

For 100 years we have inspired generations to take the best that exists and make it better.

Today, as the No.1 engine company for new widebody aircraft, our customers have come to expect the world-leading technology, performance and support that our global teams provide around the clock. But intelligent innovators never stand still - at the forefront of the aerospace industry, we have a responsibility to anticipate the solutions that our customers will need many decades from now.

In just a few years, he will see that this future started life long before he did with our Advance and UltraFan™ engine families - demonstrating our long-term commitment to keep our customers at the top of their game and to continue inspiring for many generations to come.



**Rolls-Royce**



## ORDER

## Lessor ACG may take as many as 30 737-800SFs

**A**viation Capital Group has placed an order with Aeronautical Engineers (AEI) for 15 Boeing 737-800SF freighter conversions, and options for 15 more.

The deal makes ACG the second lessor after launch customer GECAS to sign for the AEI conversion programme. AEI says that it will commence conformity modification of the first aircraft in 2016, and expects to receive supplemental type certification from the US FAA in 2017.

The converted freighter will carry 11 AAA-sized containers and one AEH/AEP container, with a payload of up to 23.5t.

Flightglobal's Fleets Analyzer shows ACG manages 89 737-800s. It has a further nine on order. ■

## TRAINING

## Start for Asia's first A350 sim

**T**raining courses have begun to be offered on Airbus's first operational A350 XWB simulator in Asia, prior to the opening of its training centre in Singapore.

The simulator is temporarily housed at the Singapore Airlines (SIA) training facility, prior to the completion of the Airbus Asia Training Centre (AATC) at Seletar Aerospace Park in 2016.

The A350 simulator is part of a suite that comprises an A380 and two A330 simulators. AATC has been offering courses since April, with the first on the A350 simulator taking place in October. ■



The first flight-test example of the aircraft is pictured on the line with wings mated to the fuselage

PROGRAMME STEPHEN TRIMBLE WASHINGTON DC

# Max 8 powers up as Boeing shows production progress

Re-engined twinjet's electrical systems successfully tested with updated cockpit functions

**B**oeing has completed the power-on milestone for the first 737 Max 8 as the re-engined and updated single-aisle aircraft is pieced together on a new assembly line at the airframer's Renton, Washington, site.

The power-on milestone activated a modernised cockpit featuring four 787-style multi-

function displays supplied by Rockwell Collins.

The 737 Max electrical system was adapted to support the improved cockpit systems, as well as the addition of electronically-controlled spoilers.

Boeing plans to roll the first 737 Max 8 powered by CFM International Leap-1B engines

off the Renton assembly line by the end of the year, with first flight scheduled early next year.

A photo of the first aircraft on the line reveals much progress since the first 737 Max fuselage arrived in Renton in August. The aircraft is installed in the first position of a newly-created, third assembly line dedicated to 737 Max flight test aircraft. The line will be repurposed after the flight test aircraft are completed to support Boeing's planned ramp up in 737 production – from 42 currently to 47 in 2017 and 52 in 2018.

The first 737 Max 8 is shown with wings mated to the fuselage. A tail cone is visible, but not installed. But neither the engines or empennage – including horizontal and vertical stabilisers – are visible in the picture. It's also not clear from the picture whether landing gear is installed. ■



Updates include 787-style Rockwell Collins multi-function displays

**Download the 2015  
World Air Forces Report**  
[www.flightglobal.com/waf](http://www.flightglobal.com/waf)

IN ASSOCIATION WITH

**Together  
ahead. RUAG**





Row could stall  
Porter C-Series deal  
**AIR TRANSPORT P24**

**RESTRICTIONS** DAVID KAMINSKI-MORROW LONDON

# Ukraine, Russia in airspace deadlock

Mutual sanctions on air services between two nations continue as negotiations fail to produce “constructive” proposals

**U**krainian authorities have yet to decide whether to engage in further discussions regarding the country’s air services standoff with Russia.

The two sides have locked in a mutual refusal to accept one another’s airlines since 25 October, and talks between the two sides have failed to resolve the impasse.

Ukraine’s infrastructure ministry says Russian carriers can still transit over Ukrainian territory if aircraft are not transporting military personnel, but a “special regime” remains in place for Aero-flot and associated Transaero services, with each flight requiring specific permission to cross

Ukraine en route to Bulgaria, Turkey, Greece, Egypt or Israel.

Russian carriers were sanctioned in September as part of the conflict with Ukraine that included the annexation of Crimea.

The ministry insists that negotiations can only progress if Russian operators halt “illegal flights” to Crimea and pay all the fines imposed on them by the Ukrainian state aviation administration during 2014-15. It adds that the Ukrainian leadership will ultimately have to decide whether to re-engage in negotiations.

Representatives of the two sides held technical discussions in Brussels on 23 October.

Russian federal aviation regulator Rosaviatsia says the talks aimed to resolve the dispute based on consideration of the “clear priority” of international law over national law.

It claims the Ukrainian delegation did not have adequate authority to accept the “constructive” suggestions, and that its counter-proposal focused only on transit flights.

“But lifting of the restrictions on transit flights will not solve preservation of regular flights between the cities of Russia and Ukraine,” says Rosaviatsia.

Meanwhile, European authorities are maintaining advice to avoid Crimean airspace, after fail-

ing to be convinced by a Ukrainian safety case intended to offer additional routes to carriers.

Ukraine’s state aviation administration issued a circular in late August declaring four routes within the Simferopol flight information region were “available” for civil aircraft operations.

But the European Aviation Safety Agency says it has reviewed the safety case provided by Ukraine, on which this declaration was based, and discovered “conflicting” information. EASA is recommending that carriers “continue avoiding” the airspace and circumnavigate the Simferopol FIR until further notice. ■

## INCIDENT

# Comair 737’s landing gear fails at Johannesburg

**O**ne of British Airways franchise partner Comair’s Boeing 737-400s has suffered a gear-collapse accident while landing at Johannesburg.

The aircraft (ZS-OAA) had been arriving as flight BA6234 from Port Elizabeth on 26 October. It had been transporting 94 passengers and six crew members, says the South African carrier, but none of those on board was injured.

The aircraft sustained a “failure” with the left-hand main landing-gear shortly after touchdown, the airline states, adding that the 737’s crew noticed an “unusual vibration” just before the gear collapsed.

The investigating authority is yet to release further details about the event.

The jet involved is a 1993 airframe, according to Flightglobal’s Fleets Analyzer database. ■



The crew said there was an “unusual vibration” before the event

## Direct To the Fast Lane

One of the many perks of WAAS/SBAS



**UNIVERSAL** AVIONICS  
SYSTEMS CORPORATION  
sales@uasc.com (800) 321-5253 (520) 295-2300



INFRASTRUCTURE JON HEMMERDINGER WASHINGTON DC

# Row could stall Porter CSeries deal

Politician's campaign against Toronto airport runway extension threatens to scupper carrier's order for Bombardier jets

**P**orter Airlines' plan to acquire Bombardier CSeries aircraft faces fresh uncertainty due to the political rise of a vocal opponent of the plan to extend the runway at Billy Bishop Toronto City airport.

Adam Vaughan, a Liberal member of parliament in Canada, has long spoken out against the runway expansion plan, which would allow Porter Airlines to operate the CSeries at the downtown airport.

Now, Vaughan is seen as a contender to become a member of the cabinet of prime minister-designate Justin Trudeau, whose Liberal party won a majority of seats in Canada's federal election.

Vaughan, whose opposition to the Billy Bishop runway extension dates to at least 2013, has said that the government would not amend the so-called tripartite agreement and that Trudeau approved his stance against the airport expansion.



Billy Bishop Toronto City is presently limited to turboprop flights

That 1983 tripartite deal between the city of Toronto, Transport Canada and airport operator PortsToronto limits Billy Bishop to turboprop-only operations.

Vaughan has argued that the runway extension would benefit Porter, but only at the expense of the Toronto community. He has said that the extension could negatively impact the environ-

ment and make the waterfront less enjoyable to residents.

Toronto-based Porter has ordered 12 CS100s and placed options for an additional 18 aircraft, but the deal is contingent upon the runway being extended.

The carrier declines to comment about how the new government might affect its fleet plan, telling *Flight International*: "It is

premature for any decisions to be made without all of the facts."

Submitted in 2013, Porter's proposal calls for extending each end of Billy Bishop's runway 08/26 by 200m, which would require filling in part of Toronto Harbour on the east and Humber Bay on the west.

Toronto's city council agreed in 2014 to a "phased framework" of growth at the airport, but first requires that the airport update its master plan and conduct an environmental assessment. Air Canada has opposed the plan.

That carrier, which has for a long time battled for more slots at Billy Bishop, has argued that the deal is tailored to the benefit of Porter and has called on the airport to grow through more turboprop operations.

Bombardier has received orders for 243 CSeries aircraft, comprising 53 CS100s and 190 of the larger CS300 variants, company data shows. ■

PROGRAMME MAVIS TOH SINGAPORE

## Mitsubishi Regional Jet's inaugural flight pushed back by two weeks

**A**round a week after stating that the Mitsubishi Regional Jet's first flight would take place by the end of October, Mitsubishi Aircraft has announced a two-

week delay, citing issues with the aircraft's rudder pedals. Its maiden sortie is now scheduled for the week of 9 November, because of the need to upgrade the controls.



Low-speed taxi trials of the MRJ commenced in September

"Under the current situation, we need to expand the movable range of the rudder, hence the decision to make the upgrade," says the Japanese airframer.

A review board from Japan's transport ministry on 29 October approved the modification, clearing the way for first flight. Mitsubishi will now proceed with high-speed taxi tests and other pre-flight evaluations. ■

**"We need to expand the movable range of the rudder, hence the decision to make the upgrade"**

MITSUBISHI AIRCRAFT

SOURCING MAVIS TOH SINGAPORE

## GKN to provide KHI with parts for PW1000G

**K**awasaki Heavy Industries is to source titanium components for the Pratt & Whitney PW1100G and PW1400G engines from the UK's GKN Aerospace.

The rotating parts for the geared-turboprop engines will be manufactured at the Swedish facility Aerospace Engine Systems.

Airbus's re-engined A320neo is fitted with the PW1100G while the PW1400G is intended to power Irkut's MC-21. The supply agreement covers production to 2028, and first deliveries are scheduled for the end of this year.

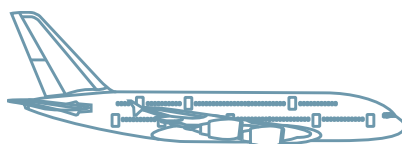
The company is a risk-sharing partner on the geared-turboprop programme responsible for intermediate compressor and turbine exhaust cases on the family. ■



# It's quiet, it's clean, it's MTU.

15% less fuel, 15% lower CO<sub>2</sub> emissions and noise levels cut in half – the Geared Turbofan™ engine is the aircraft engine of the future. And it features MTU's unique high-speed low-pressure turbine. Just some of the reasons why the Pratt & Whitney's PurePower® engine family is the first choice for the next generation of single-aisle aircrafts and regional jets.

[www.mtu.de/en](http://www.mtu.de/en)





# TOTAL PARTNERSHIP



## BENCHMARKING EXCELLENCE

- **Effective:** being the most powerful and reliable swing role fighter
- **Proven:** in global operations with highest operational statistics
- **Trusted:** to deliver performance, political and industrial partnership

 **Eurofighter  
Typhoon**

**Effective Proven Trusted**



[www.eurofighter.com](http://www.eurofighter.com)



Airlines secure  
ADS-B Out  
extension  
NEWS FOCUS P28

FLEET DAVID KAMINSKI-MORROW LONDON

## Transaero troubles see Aeroflot take first 747s

**A**eroflot is to introduce Boeing 747s into its fleet as a result of the fall-out from the collapse of rival Transaero.

The Russian flag-carrier has provisionally agreed to lease four 747s as a part of a package negotiated with Sberbank's leasing arm. This package includes 10 Boeing 737-800s, which will enter service in 2016, says the federal air transport authority Rosaviatsia.

It has not identified the 747 variant involved, but Transaero has operated several 747-400s including four from an Irish Sberbank leasing affiliate, according to Flightglobal's Fleets Analyzer database.

Rosaviatsia says that Aeroflot is discussing additional lease of aircraft owned by Russian banks VTB and VEB. It puts the Transaero fleet at 106 aircraft. "Termination of operations means the airline fleet is not used for transport," it states.

Aeroflot is taking on additional capacity in order to fill part of the void left by Transaero's grounding on 26 October.

Over the weekend of 24-25 October – just before Transaero's operating certificate was withdrawn – several of its aircraft were flown from Moscow to a storage facility at Teruel in eastern Spain.

These included at least six 747-400s as well as 767-300ERs and around a dozen 737s.

Transaero had been undergoing a fleet modernisation and a number of new Airbus A320-family jets bound for the airline have been flown directly from the assembly line to storage.

This modernisation programme also included orders for four Boeing 747-8s and four Airbus A380s, as well as A320neo jets. Transaero was also in line to take Sukhoi Superjets and Irkut MC-21s, and was a tentative customer for the A330neo.

Over the first nine months of this year, Aeroflot has expanded its fleet with three Boeing 777-300ERs, six 737-800s and four Superjets, while removing five Ilyushin Il-96s. Its fleet at the end of September stood at 163, the carrier states, while the Aeroflot Group overall has 261. ■



Manufacturing could restart by 2018, believes the airframer

PROGRAMME TOM ZAITSEV MOSCOW

## Sokol chosen for Il-114 production

Ilyushin chief designer confirms revived regional turboprop will be built at facility famous for assembly of MiG fighters

**I**lyushin is to use the Sokol aviation plant in Nizhny Novgorod to restart production of the mothballed Il-114 regional turboprop commuter.

Referring to consultations with the federal and local governments and parent United Aircraft, Ilyushin chief designer Nikolai Talikov says a formal announcement is to be made shortly.

"This is a final decision," he says. "There is no discussion about where to site the Il-114 serial production anymore. Today, we're only doing necessary paperwork and resolving related financial issues."

Ilyushin received a proposal from Nizhny Novgorod's regional administration to locate the project on the Sokol premises, and the plan has already been endorsed by Russian prime minister Dmitry Medvedev, reveals Talikov.

He adds: "Likewise, there are no doubts regarding the need for the Il-114 in Russia. It is the only

domestic aircraft type in that class, while foreign ones do not meet specific requirements of operation in our remote regions."

Ilyushin believes it is possible to restart Il-114 manufacturing by 2018, with an initial batch to be built using aerostructures left over and stored at former affiliate manufacturer TAPO in Tashkent.

"They would suffice to assemble five airframes," says Talikov. "We've just checked it out in Tashkent and will arrange for shipping them to Russia. This should enable us to speed up the launch of the programme by two years and roll out the first domestically built Il-114 in 2017 or 2018."

Since opening in 1932, Sokol has built various combat aircraft types, most notably MiG fighters. It also launched production of Yakovlev Yak-130 jet trainers before handing it over to Irkut, and dabbled in manufacturing a modernised Myasischev M-101 Gzhel single-engined light turboprop. ■



### INCIDENT

## Superjet has brush with airbridge

An Interjet Sukhoi Superjet 100 has hit an airbridge at Mexico City International airport while being towed.

Photos posted on Twitter show damage to the aircraft's nose after it was wedged under an airbridge. No injuries were reported, in the 25 October incident, which happened while the aircraft was being towed from a hangar, says the Mexican carrier.

The airline has launched an investigation into the incident.

REGULATIONS JON HEMMERDINGER WASHINGTON DC

# Airlines secure ADS-B Out extension

Technology must be installed by end of decade, but FAA agrees to allow use of current GPS receivers for tracking until 2025

US carriers scored a major regulatory victory after the Federal Aviation Administration in August approved an exemption to a rule requiring that by 2020 aircraft must have automatic dependent surveillance – broadcast out (ADS-B Out) systems.

While airlines must still install ADS-B Out across their fleets by that date, the exemption allows them to operate until 2025 with GPS receivers that may not meet the rule's requirements for position accuracy and system integrity.

The deal takes some pressure off airlines and avionics companies, and was enough of a victory to convince US carriers to throw their support behind the controversial ADS-B Out mandate, Joseph Bertapelle, JetBlue Airways' director of strategic airspace programmes, told Flightglobal at an avionics conference on 15 October. It marks the first such blanket exemption from strict compliance since the mandate was enacted in 2010, and reflects unanticipated delays in activating global rivals to the US-funded GPS system, such as Europe's Galileo, Russia's GLONASS and China's Beidou.

The rule was adopted by the FAA assuming a multi-constellation data link would become available before the mandate deadline on 31 December 2019. Since such equipment is now expected to be delayed until at least 2021, airlines had faced the costly prospect of needing to install a GPS-compliant system before 2020, before then upgrading to a multi-constellation receiver only a year later.

## FLEXIBILITY

Airlines for America, which proposed the exemption in April 2015, says the deal gives carriers the flexibility necessary to meet the FAA requirements, and keeps them from having to perform multiple retrofits as the technology advances. The group's proposal also notes that GPS receivers

## ADS-B is seen by the FAA as a replacement to its current system of tracking aircraft using ground radar

that actually meet the standards are not readily available for Airbus and Boeing aircraft.

But many airlines already have installed non-compliant GPS receivers on some aircraft. With the exemption in place, these carriers will have an extra five years before needing to replace the relatively new systems, documents show.

The FAA tells Flightglobal the exemption allows for "rare outages of the required performance", and "does not delay any of the ADS-B benefits".

Core to the NextGen effort, ADS-B is seen by the FAA as a replacement to its current system of tracking aircraft using ground radar. An ADS-B Out system has a GPS receiver that determines the aircraft's position, and a transponder that transmits the position and other information "out" to ground stations. Those stations then send the data to air traffic controllers.

Unlike radar tracking, which can provide position updates roughly every 12s, ADS-B provides updates once every second, according to Bertapelle.

Most receivers on the market today for Airbus and Boeing aircraft do not reliably meet the FAA's new performance standards, according to regulatory documents. Instead, many of the manufacturers' aircraft are equipped with one of two older GPS receivers: selective availability on (SA-On) or selective availability aware (SA-Aware), these documents show.

## SUFFICIENT CHANGE

Although not used since 2000, "selective availability" had allowed the US government to intentionally degrade GPS accuracy for security, documents say. SA-On receivers meet the rule standard at least 95% of the time, with SA-Aware units at 99.9%, according to the FAA.

But that is not good enough, as changes in satellite spacing or outages could make aircraft equipped with such transponders invisible to air traffic controllers. That is why the FAA mandates that aircraft must be equipped with a more reliable GPS receiver, using

satellite-based augmentation system technology.

In comments to the FAA, United Airlines requested an extension beyond 2025, on the grounds that global multi-constellation receivers may not be available until after that time. Although the FAA denied United's request, in August it quietly granted the exemption until 2025, in a deal that will allow aircraft equipped with older SA-On and SA-Aware receivers to fly for another five years.

However, if an aircraft's SA-On receiver falls below standards, the aircraft can only fly if there is a back-up means of surveillance, such as with ground radar, the exemption says. The FAA also says it will provide a "service availability prediction tool" that carriers can use to predict if an aircraft flying a specific route will meet the revised requirements. The administration confirms that no airlines have yet filed for the exemption, and declines to speculate about how many might potentially apply.

Bertapelle, however, says that JetBlue will be among them. Flightglobal's Fleets Analyzer database records the carrier as having a combined 152 Airbus A320 and A321 jets in current use. ■



JetBlue is one of the carriers expecting to make use of a five-year exemption agreed earlier this year



E-JETS  
**E2**  
THE SECOND  
GENERATION

# Our vision is taking shape.

The E-Jets E2 program has moved from concept to reality. We're far beyond the milestone of first-metal being cut, and are now busy assembling the first E2 prototype for first flight next year. The entire E2 family is on schedule, on target, and on the way to affirming its position as the world's most preferred family of jets up to 130 seats. Our vision remains clear. And it is taking shape today.



**1,100+ E-JETS.  
70 AIRLINES.  
50 COUNTRIES.**

LOVE WHAT YOU FLY



*Commercial Aviation*



# FROM BIG TO SMALL **ADS-B FOR ALL**



**NXT<sup>TM</sup>**  
800/600  
ADS-B XPDR



**LYNX<sup>®</sup>**  
MULTILINK SURVEILLANCE SYSTEM

## NextGen ADS-B Avionics for All Aircraft

As the aviation industry turns to ADS-B to securely track and monitor air traffic, ADS-B pioneer L-3 is there with a full line of mandate-compliant products for all types of aircraft:

- ACSS was first to certify ADS-B Out, with installations on hundreds of airliners, and has since introduced the NXT-800/NXT-600<sup>TM</sup>, a new generation of transponders for air transport, regional, corporate and military transport aircraft.
- SafeRoute<sup>®</sup>, a suite of certified ADS-B In solutions, brings ADS-B benefits to the cockpit, helping airlines reduce flight times and fuel consumption, while improving situational awareness.
- L-3's new Lynx<sup>®</sup> line of products brings ADS-B In/Out to General Aviation, including ADS-B traffic and weather information.

Whatever aircraft you fly, contact L-3 for the right ADS-B upgrade solution. Visit [L-3com.com/AviationProducts](http://L-3com.com/AviationProducts) for more information.

Aviation Products

**ACSS<sup>®</sup>**  
An L-3 Communications  
& Thales Company

[L-3com.com](http://L-3com.com)



**King Stallion makes flight test debut**  
DEFENCE P32

TESTING STEPHEN TRIMBLE WASHINGTON DC

## KC-390 tests resume as defence unit revenues fall

Embraer has flown its KC-390 for the first time in more than eight months, as the company's Defence and Security business unit adapts to a devalued Brazilian currency and a slower development schedule for the new tanker-transport.

The 26 October return to flight – which was performed from Embraer's test centre in Gavião Peixoto – ended a hiatus caused by a fiscal crisis in Brasília. As the Real currency has devalued by 50% since the beginning of the year, the government has slowed payments to the manufacturer on a host of projects, but none bigger than the KC-390.

In July, Embraer announced signing an agreement with the Brazilian air force that extended the KC-390 development schedule by a year, with entry into service now to occur in 2018. The pact also included provisions to reimburse the company more

than \$370 million owed by the service on the project so far.

Embraer officials have also restructured the division in order to remain profitable, despite sharply lower revenues as shown on the balance sheet, which is converted to suddenly much more valuable US dollars.

The defence and security segment has done “a great job rapidly adjusting the business to the new reality”, Embraer chief executive Frederico Curado told analysts during a third quarter earnings call on 27 October. “It's a year of transition,” he adds.

The timing of the Brazilian economic crisis has posed a severe test for the KC-390 programme, in particular. Embraer completed a 1.5h first flight with the type from its Gavião Peixoto site on 3 February 2015, and in the interim period its team had moved forward with ground vibration testing prior to the return to flight.



The tanker-transport made its flight debut in early February 2015

However, the public can now expect to be “seeing the airplane flying much, much more than the last several months”, Curado explains.

The decline in domestic defence spending may be partly offset by new export deals, especially for the A-29 Super Tucano. Embraer has also kicked off

development of the F-39 Gripen fighter for the Brazilian air force with prime contractor Saab.

Defence and security unit revenues declined to \$182 million during the third quarter of 2015, compared with \$346 million in the same period of 2014, but should remain profitable in 2016, Curado says. ■

SELECTION JAMES DREW WASHINGTON DC

## Japan picks KC-46A for tanker top-up

Tokyo to bolster in-service KC-767 fleet, with trio of Pegasus refuellers to be introduced by nation's air force around 2020

Months after being rejected by South Korea and weeks after first flight, Boeing's KC-46A has been chosen by Japan to supplement its KC-767 tanker fleet.

Announced by Japanese defence minister Gen Nakatani on 23

October, the decision is a big win for Boeing after a troubled start to its next-generation tanker development for the US Air Force.

The KC-46A Pegasus is nearing the end of its development phase, having achieved first flight from

Paine Field in Washington on 25 September, following a roughly nine-month delay. Japan intends to procure three tankers for fielding in the 2020 timeframe, at a cost of more than ¥20.8 billion – about \$173 million per aircraft.

Boeing says the KC-46A appeals to Tokyo as it will be capable of refuelling the Japan Air Self-Defense Force's future fleet of Bell-Boeing MV-22 Osprey tiltrotors.

“We look forward to working alongside the US government to help Japan expand its aerial refuelling capabilities with Boeing's next-generation KC-46 tanker,” the airframer says. “Japanese industry plays a vital role in Boeing's commercial and military programmes, and we hope to increase our presence in Japan.”

The decision to choose US equipment over the Airbus A330

multirole tanker transport further strengthens ties between Tokyo and Washington DC, and will allow for common operations and training, according to the Japanese defence ministry. Airbus had declined to participate when Japan issued a request for proposals in September, saying that the notice was clearly intended for a procurement of the Boeing model.

Japan has allocated funding for the acquisition in its fiscal year 2016 budget, and Boeing expects to receive a contract next year.

Boeing is building four 767-2C-based tankers in support of the USAF development effort, and a decision on whether to approve low-rate initial production is due next year. Despite delays and cost overruns, the company aims to deliver its first 18 operational tankers to the service by August 2017. ■



Four boom-equipped aircraft already support fighter operations





OPERATIONS BETH STEVENSON LONDON

# Global Hawk link key to AWACS fleet life extension

The lifespan of NATO's airborne warning and control system (AWACS) fleet has become increasingly dependent on a future ability to operate alongside its unmanned Alliance Ground Surveillance (AGS) capability.

Under current plans, NATO's Boeing E-3A Sentry fleet is set to go out of service in 2025. An as-yet unfunded initiative to extend this until 2035 would be in part reliant on Northrop Grumman RQ-4 Global Hawk unmanned air vehicles being able to transmit ground moving target indication (GMTI) sensor imagery to the AWACS platform.

NATO is conducting a review on the life of its AWACS fleet, with a decision on any life extension expected in mid-2016. This would rely on the 16 nations that are involved in supporting the capability agreeing to continue funding it until 2035.



NATO's E-3A Sentry is currently due for retirement in 2025

"If [there is not an] ability to deliver this joint ISR [intelligence, surveillance and reconnaissance] architecture that links into the national systems [then] we can't communicate properly between the two assets that NATO owns,"

Air Cdre Paddy Teakle, deputy commander of the airborne early warning and control force command at NATO, told SMI's Airborne ISR conference in London.

Teakle says that while there are no major radar modifications

planned for the E-3A, upgrades that could keep the system relevant until 2035 include increased bandwidth availability, more secure communications, and airborne networking to receive data feeds from the Global Hawk.

A more digitised glass cockpit is also on the cards, he adds, as it is becoming increasingly difficult to fix and replace analogue components. "In the future the E-3A should be able to access data from a shared database and the GMTI feed from the AGS Global Hawk," Teakle says. "It will really enhance the E-3A's ability to contribute to the kill chain."

If the five-strong AGS fleet is not able to operate in concert with AWACS then this could make the E-3A obsolete sooner, he notes.

Flightglobal's Fleets Analyzer database records NATO as having 16 E-3As in operational use. ■

ROTORCRAFT JAMES DREW WASHINGTON DC

# King Stallion makes flight test debut

Almost a year behind schedule, the first of four development examples of the USMC's CH-53K helicopter takes to the skies

Sikorsky's CH-53K King Stallion has finally begun its 2,000h flight test programme, with a 30min debut performed from the company's development flight centre in West Palm Beach, Florida on 27 October.

The milestone flight occurred almost a year late, and nine years after Sikorsky received a development contract from the US Marine Corps to produce a replacement for the CH-53E Super Stallion.

The new model – which will be the largest helicopter in the US military inventory – features a fly-by-wire control system and glass cockpit, and will be able to lift 12.2t – triple the weight of the in-service rotorcraft.

The debut marks the start of a three-year flight test programme, to be performed using the first four engineering and manufacturing development (EMD) aircraft.

Sikorsky had hoped to fly EMD-1 last December, but issues including problems with the main rotor gearbox delayed the event.

USMC programme manager for heavy-lift helicopters Col Hank Vanderborcht says the service's initial operational capability milestone planned for 2019 is still achievable, despite the delay. However, he expects a three-month slip in the Depart-

ment of Defense being ready for a so-called Milestone C review – a decision point that approves the entry into low-rate initial production. The current estimate places that decision in January 2017.

Vanderborcht and Michael Torok, vice-president of Sikorsky's CH-53K programme, say a potential production gap caused by the development delay has been bridged with additional orders for

four additional aircraft to support operational test and evaluation, plus another two which are being purchased for use by the US Naval Air Systems Command's VMX-22 test and evaluation squadron.

Before the production decision, Sikorsky must demonstrate the CH-53K's performance against the requirements set at the start of the programme, such as lifting 12.2t and carrying a 5.4t payload for 110nm (203km).

Torok expects further flights of EMD-1 to occur "every couple of weeks", after data is compared against engineering predictions and computer models.

Sikorsky has already clocked 230 flight test hours using its CH-53K ground test vehicle.

The USMC has stated it intends to procure 200 King Stallions, with full-rate production expected to start in 2020. ■



EMD-1 was airborne for 30min at Sikorsky's West Palm Beach site





# COMPLETE SURVEILLANCE CAPABILITY SIZED FOR YOUR MISSION.

Introducing the Boeing Maritime Surveillance Aircraft. It combines proven ISR capability derived from the Boeing P-8 mission system with the Bombardier Challenger 605. The result is a low-risk, non-developmental system that delivers an affordable and superior multi-mission surveillance solution, sized to meet your operational requirements.





## Request for Proposal

**SAUDIA** is pleased to announce its requirement for a number of wide body aircraft for Umrah & Hajj operations 1437H corresponding to 2016 from IOSA Certified Operators on ACMI wet lease basis in accordance with following terms and conditions:

- Lease term from 21 Rabi Awaal 1437 H to 02 Rabi AlThani 1438 H Corresponding to 01 January 2016 to 31 December 2016.
- Seats configuration: minimum 300 seats.
- Minimum seat pitch 30 inch.
- MGH 2200 BHrs for the entire lease period per unit.
- If Umrah only; 1400 BHs per unit.
- If Hajj only; 650 BHs and 750 BHs depending on aircraft type.
- Cycle ratio 3 to 1 and 4 to 1 depending on aircraft type.
- MFD must not be earlier than 1997.
- Operating base at JED – KSA.
- Deployment: Mainly Iran, Algiers, Turkey, Indian sub-continent, Far East, ME, Gulf & Europe.

Please quote your ACMI rate, which shall include the following cost parameters:

- 5 set of crew.
- Aircraft marshaling at the base.
- Hull & third party insurance covering the lease term.
- Aircraft should have functioning audio & video entertainment system
- Aircraft in white fuselage with **SAUDIA** (standard) letterings on both sides and logo on the tail (decals);
- Aircraft delivery/re-positioning cost (excluding fuel for repositioning flight)
- Crew hotel accommodation, transportation at the base (JED).
- Crew salaries, per diem, social cost, license insurance, Iqama (Residence Permit) fees whenever required by Saudi Government, etc.

Contestants shall submit commercial offers along with aircraft specifications/documents. Fuel burn data and technical dispatch with base stock engineering support undertakings. P.S.

- Deadline for receiving offers is 15 days from publishing date; offers received beyond target date may not be considered.
- No commitments or agreement shall be concluded unless the lessor and its aircraft are accepted by **SAUDIA** Maintenance/ Flt. Ops. Standards and Quality and GACA
- **SAUDIA** reserves its right to accept or reject any or all proposals at its sole discretion without stating any reasons of whatsoever nature, which shall not be challenged before any authority or court of law.

Please confirm availability and quote your ACMI price.

Offers to be addressed to email ([rfp.sv@saudiairlines.com](mailto:rfp.sv@saudiairlines.com))  
Tel +966 2 686 4616/ Saudi Arabian Airlines





**KAI to boost Surion production in 2016**  
**DEFENCE P37**

**DEVELOPMENT** JAMES DREW WASHINGTON DC

## Heavyweight solution for F-35 ejection seat flaws

The US F-35 joint programme office (JPO) expects Martin-Baker to cover the cost of modifying the Lockheed Martin type's US16E ejection seat, after it was deemed too dangerous for lightweight pilots.

Programme executive officer Lt Gen Christopher Bogdan says two seat-related modifications are being pursued, and that the US government "is not paying a penny for the engineering and implementation of these fixes".

"The supply chain from Lockheed through BAE Systems through Martin-Baker will bear the cost of fixing this, as they should," Bogdan said, following a congressional hearing on 21 October.

At that hearing, Bogdan said the neck stress for lightweight pilots through the ejection, wind blast and parachute opening phases at low speeds is too high. The chance of a potentially fatal neck injury from an ejection in the F-35's low-speed flight envelope has been calculated at once in every 50,000 flight hours for pilots weighing less than 61.7kg (136lb), and once in every 200,000h for those weighing up to 74.8kg.

"That is a very, very small risk," Bogdan says. "There are many other airplanes in our in-

ventory that we accept similar risks on."

The US16E is meant to safely accommodate pilots weighing between 46.7kg and 111kg, but operations are being temporarily restricted to a minimum of 61.7kg as a safety precaution. This has affected only one pilot.

To resolve the problem, the programme office says a head support panel will be installed between the parachute risers to prevent the pilot's head from going back too far during ejection. Secondly, a switch will allow lighter pilots to slightly delay parachute deployment, reducing the opening shock.

"Both the weight switch modification and the head support panel are scheduled to be introduced when the next upgrade of the ejection seat is available near the end of 2016," the JPO says.

The JPO also has been working for six months to slim down the F-35's third-generation helmet-mounted display, produced by Rockwell Collins and Elbit Systems of America joint venture Vision Systems International. This should reduce the total helmet weight from 2.31kg to a target of 2.18kg. A preliminary design review on the improved helmet is scheduled for December. ■



US Air Force

**Seven of the fighters should be operationally ready from April 2016**

**SUPPORT** BARTOSZ GLOWACKI WARSAW

## Sofia powering up MiG-29 availability

Agreement with Polish defence ministry to overhaul RD-33 engines will boost fleet readiness for Bulgarian air force

Poland's WZL-4 military aviation works near Warsaw is to overhaul six Klimov RD-33 engines for the Bulgarian air force's RAC MiG-29s, under an agreement signed in late October.

Final approval for the more than €6.1 million (\$6.7 million) programme is still required from the Bulgarian parliament, but defence minister Nikolay Nenchev says the price asked by Poland for the repair activity was €600,000 less per engine than that requested by RAC MiG.

Poland also offered a shorter repair time, and will cover the

costs of transporting the engines.

Within 20 days of the deal being signed, Poland will lend two RD-33s to Bulgaria for temporary use, enabling another of its MiG-29s to perform air defence missions. Work on the first four of its own engines will be completed within six months, and on the remainder within another four months.

The Bulgarian air force currently has only four MiG-29s in an airworthy condition, but the new support arrangement with Warsaw will see this increase to seven by April 2016. ■

## CMC's Integrated Cockpit Solutions

- Transport aircraft, trainers and helicopters
- Industry standard interfaces
- Off-the-shelf technology

Visit Us at the Dubai Airshow **Booth 1833**

**Esterline** **CMC Electronics**  
www.cmcelectronics.ca

# Farnborough International Airshow

# \$204 Billion

of orders and commitments placed

**1500+**  
exhibitors from  
30 countries



|                |                   |         |
|----------------|-------------------|---------|
| CIVIL AVIATION | BUSINESS AVIATION | DEFENCE |
| SPACE          | ROTARY WING       | UAS     |
| MNFCT TECH     | MRO               | FUTURES |

*In 2014, The Farnborough International Airshow created a record US\$204 billion in total orders. We pride ourselves on facilitating unique networking opportunities for our exhibitors with the highest calibre of international delegations and trade visitors across all sectors. Contact us today and discover how we can be the best for your business.*



**11-17 July 2016**  
[farnborough.com](http://farnborough.com)

## We're the best for your business!



UAV schemes look to go the last mile  
NEWS FOCUS P40

MANUFACTURING GREG WALDRON SEOUL

# KAI to boost Surion production in 2016

Airframer prepares to raise output of KUH-1 transport to three per month, as naval requirements approach confirmation

**K**orea Aerospace Industries (KAI) is gearing up to increase the production rate of its KUH-1 Surion transport helicopter, while the type's amphibious variant is also on the verge of attaining type certification.

The production increase – from a current rate of one aircraft a month to three – is likely to take place in 2016, says Kim Hyong Jun, vice-president and general manager of KAI's aircraft marketing division.

South Korea's army has so far received 40 examples of the 8.7t type, from an eventual total of more than 200. "There have been no major issues from a technical standpoint," Kim says, with some minor engineering issues which were encountered with the first 10-15 examples having been fixed

and the service now experiencing availability rates above 80%.

KAI is confident an amphibious version designed for the nation's marines will receive type certification during November. A company-operated Surion reconfigured to the amphibious standard has passed a number of tests, including operations to and from naval vessels. The new variant's main rotorblades can be folded manually for storage aboard a ship, and options are being explored to automate this function.

The marine version can carry up to nine armed personnel in addition to its crew of two pilots and two gunners, and also can be equipped with additional long-range fuel tanks, if required.

Kim expects a first contract to call for 36 examples, but says that



Korea Aerospace Industries

**A marine variant is on track for November certification**

this need is likely to grow to 40. A production contract is expected sometime in 2016.

"We used one helicopter for dedicated test flights for more

than a year," he says. "We've passed all development and operational tests with the navy."

KAI also plans to propose a naval variant of the Surion to South Korea, equipped with torpedoes and anti-ship missiles, for its 40-aircraft Korea Multirole Operations Helicopter requirement. A decision on the programme is also anticipated next year.

Kim says that international marketing efforts with the Surion are likely to be launched in 2017 and will focus on some countries where KAI has already sold its T-50 advanced jet trainer and KT-1 basic trainer. These include Indonesia, Iraq, Peru, the Philippines, Thailand and Turkey. ■

## SALES

### Airbus Helicopters sees high international demand for LAH

Airbus Helicopters sees a large potential market for the Korea Aerospace Industries (KAI) light attack helicopter (LAH), which is set to be a further development of its H155 design.

Norbert Ducrot, Airbus Helicopters' senior vice-president, North Asia, foresees South Korean demand for 214 LAHs and 100 examples of a light civil helicopter variant.

Under the terms of a contract signed in June, the company is to transfer its H155 assembly line to South Korea, for KAI to assume production. Internationally, Airbus Helicopters estimates that a market exists to produce 300-400 LAH to replace legacy attack helicopters.

"You can imagine a lot of countries that cannot afford the current attack

helicopter could be interested in a version that is lighter but also very powerful," Ducrot says.

To enter service by 2022, the LAH will be armed with a chin-mounted 20mm cannon and air-to-surface missiles, and will be capable of carrying between six and 10 troops. KAI expects the programme's civilian variant to be available for use in 2020. ■

## FIGHTERS

### KF-16 upgrade poised for take-off, says Lockheed

**L**ockheed Martin anticipates that it will soon get the green light to commence a long-awaited upgrade for South Korea's KF-16 fighter fleet.

The \$2.7 billion Foreign Military Sales programme deal, as outlined in July 2015, will see the company modernise Seoul's 134 C- and D-model KF-16s with new avionics, weapons and Northrop Grumman's Scalable Agile Beam Radar.

Talks are currently ongoing



US Air Force

**Type will receive new avionics**

between the governments of South Korea and the USA.

"Those discussions are very

mature, and Lockheed is looking forward to their conclusion, so that we can move forward with an agreement this year," Randy Howard, who leads the company's international sales efforts for the F-16, told *Flight International* at the Seoul International Aerospace & Defense Exhibition.

When the agreement is signed off, Lockheed will upgrade two KF-16s – single- and twin-seat examples – to its F-16V configuration. These aircraft are already

in storage in the USA, having been part of a now-cancelled, BAE Systems-led programme to update the Republic of Korea Air Force fleet.

Once the validity of Lockheed's upgrade has been proven with this lead pair, the remaining 132 aircraft are to be upgraded in South Korea.

"It's been a long process for South Korea," Howard notes. "The F-16V upgrade will significantly enhance its capability." ■



**NOW'S THE PERFECT TIME  
TO EXTEND YOUR SUCCESS.**







**777-300ER. A BETTER WAY TO FLY.** The Boeing 777-300ER's unique combination of superior range, outstanding fuel efficiency and passenger-preferred comfort has created long-range success for carriers around the world. And with recent upgrades that further reduce costs and boost revenue, now's the perfect time to add to that success, in the air and on the bottom line. The 777-300ER makes every fleet a more profitable fleet. That's a better way to fly.





UNMANNED SYSTEMS BETH STEVENSON LONDON

# UAV schemes look to go the last mile

Potential commercial applications for unmanned technology on the rise, but big airspace integration challenge remains

The enthusiasm that people have for the unmanned air vehicle market is infectious, and existing technology is being adapted to applications previously not thought of in order for them to take a share of the sector's opportunity.

The commercial UAV world got together in London from 20-21 October, at an event bursting with ideas on how to use these systems – from parcel delivery to natural-disaster monitoring and increasing operating safety on runways.

"We wanted to create drones for not just image collection, but something that is really needed," says Sameera Almula, research assistant at Khalifa University in Abu Dhabi, which has been researching using UAVs for fog dissipation.

The university researched the concept of spraying a brine solution from a UAV's 40kg (88lb) payload into the fog that overhangs a runway, which would create water droplets large enough to take it to the ground. It says that by using seven air vehicles, a 95% improvement in visibility was made within 20min, so runways could be back in service quicker than would be experienced naturally.

The same approach has also been designed for use over roads, and while the team concedes that the concept has not yet been tested over a runway, it could do so with support from aviation authorities.

Another application that could benefit the manned aviation industry is a participation in the last-mile delivery of cargo that has been shipped using air freighters. One such example is Swiss Post and Swiss WorldCargo – the air-freight division of Swiss International Air Lines – which began testing the Matternet One UAV last July to bolster its cargo service.

Oliver Evans, chief cargo officer at Swiss International, says that operators are no longer just competing with each other, but also other modes of transport.

## ROAD ALTERNATIVE

This last-mile delivery of packages weighing 2-5kg (4.4-11lb) is growing in competition, and Evans says the task could be fulfilled using UAVs, rather than road vehicles. "We believe this will have a fundamental impact on the air cargo world," he says.

The trial will move towards introducing low-risk commercial operations, with a next phase to start in the coming months.

Evans says that once regulations have caught up, "even urban logistics will be able to benefit from unmanned technology", although this is the last area that will be addressed in the UAV parcel-delivery market.

NASA, meanwhile, is helping to facilitate such work by looking at how UAVs can fit into low-altitude air-traffic management.



Swiss Post is testing the Matternet One for package delivery

A so-called four-generation approach is planned, with the first having been tested last August. This assessed a system for use over unpopulated areas with minimal aviation traffic, and will now be rolled out to the Federal Aviation Administration's UAV test sites for further validation.

The second build, in October 2016, is to test beyond-line-of-sight and longer range-operations over sparsely populated areas. Build three – to be carried out in January 2018 – will allow for limited parcel delivery, with full-scale delivery operations expected by build four in March 2019. This anticipates the introduction of a beyond line-of-sight system to be used over densely populated urban areas.

"There are calls for a persistent system and a field-portable system," Parimal Kopardekar, manager of the NextGen concepts and technology development project at NASA's Ames Research Center, said at the show. "You need some way to manage the density of systems that we will see in the next 10 years."

Kopardekar has called for flexibility where possible and structure where needed, because scalable operations would be required for economic growth in low-altitude operations.

Drawing on the easily deployable nature of UAVs, humanitari-

an work in areas that have been hit by natural disasters is increasing in popularity.

A team from the Qatar Computing Research Institute's UAViators Humanitarian UAV Network carried out work using rotary-wing UAVs such as the DJI Phantom to help assess the aftermath of the earthquake in Nepal in April 2015. This included performing 60 flights in Kathmandu in September, authorised by the Civil Aviation Authority of Nepal.

## DISASTER RESPONSE

In six months' time, the team is planning to also test some fixed-wing systems in Nepal. Patrick Meier, director of social innovation at the institute and founder of UAViators, is calling on more teams with an eagerness to help to join them.

Similar to the operations in Nepal, Chinese authorities used unmanned vehicles to help assess the damage after an industrial explosion in Tianjin earlier this year. And in the wake of Cyclone Pam, which hit Vanuatu last March, UAV teams including from Heliwest and X-Craft were deployed in order to monitor and map the area, operating safely while Royal Australian Air Force Lockheed Martin C-130Js also were making cargo deliveries. ■



Unmanned systems aided inspection work after Tianjin explosion





Predator XP

# **COST-EFFECTIVE MULTI-MISSION CAPABLE**

- 3+ million flight hours proven performance
- Target tracking day/night, land/sea
- Automatic Takeoff & Landing System (ATLS)
- Lynx Multi-mode Radar provides photographic quality imagery all weather, day/night
- Land and maritime radar modes, Automatic Identification System (AIS)
- 35 hours endurance
- Operating radius > 1,000 nm

[www.ga-asi.com](http://www.ga-asi.com)

©2015 General Atomics Aeronautical Systems, Inc.



Leading The Situational Awareness Revolution

SAFETY DAVID LEARMOUNT LONDON

# Rivals revive grievance over Northolt

Biggin Hill and Oxford operators allege double standards, following MoD study into potential growth in non-military traffic

Owners of two business aircraft aerodromes serving London have renewed an attack on the safety of RAF Northolt for civilian operations, on the grounds that the results of a safety audit of the base were withheld from a judicial review of their case earlier this year.

Oxford and Biggin Hill airports say operators of civil jets using the dual-use airfield in northwest London adhere to performance demands for military aircraft that would be illegal at competing civil aerodromes.

In a review in January, a judge ruled that civil use of Northolt was legal, but stated that the Civil Aviation Authority, not the Ministry of Defence, was responsible for the safety of civil users of the military aerodrome.

Since then, a freedom-of-information request has unearthed MoD-commissioned reports on the commercial feasibility of expanding the use of Northolt by regional airlines and business aircraft, up to



The RAF facility has long welcomed business aircraft movements

50,000 movements a year. At present, regional airlines do not use Northolt but business aircraft do, and the aerodrome is cleared for 20,000 movements a year.

The review of the commercial viability of increased Northolt civil operations was completed by Ernst & Young in February 2012, and the company had subcontracted to Mott MacDonald the task of

reviewing Northolt's compliance with the CAA's regulations for licensed aerodromes, and the International Civil Aviation Organisation's Annex 14 on the same subject. The Mott MacDonald report states that Northolt would not as it currently operates qualify to be a licensed aerodrome. It says: "The number and degree of infringements of the CAA/ICAO ob-

stacle-limitation surfaces is such that we do not believe the CAA would license or EASA [European Aviation Safety Agency]-certify Northolt as suitable for public transport use based on its existing declared distances [runway lengths] and method of operation."

It points out that if the declared runway lengths were reduced by displacing the thresholds, it would increase the runway end safety areas and also raise the obstacle limitation surfaces so that fewer obstacles encroached. This would, however, render the airport unsuitable for fuel-laden long-range business jets.

"RAF Northolt's aerodrome safety standards are fully regulated by the MAA [UK Military Aviation Authority]," the MoD says. "A recent judicial review confirmed that no changes are required in relation to current aerodrome standards which are fully published and promulgated to civil users who operate at the aerodrome." ■

## SCHEDULED CHARTER

### Falcon to ferry 400 oil staff daily on Q400s

Falcon Aviation Services has launched one of the world's biggest regular business aviation services, ferrying 400 oil workers daily from its Al Bateen base in Abu Dhabi to two facilities on islands off the coast of the emirate.

Falcon will use two Bombardier Q400s to transport employees from the refurbished Sheikh Zayed terminal at the city centre airport to Abu Dhabi Marine Operating Company sites at Das Island and Zirku Island. There will be three flights a day on each of the turboprops.

"This is a momentous achievement, as we had a short time frame in which to set up and deliver this service," says chief operating officer Capt Ramandeep Oberoi. ■

See Feature P63

## DISTRIBUTION

### Eclipse 550 pitched to China market as One Aviation looks to certification

One Aviation is making a push for the Chinese market ahead of the Eclipse 550's anticipated certification there. The company behind the pioneering very light jet as well as the in-development Kestrel turboprop single has appointed its first distributor in China.

Jinggong General Aviation, which represents other general aviation brands including Cirrus and the Mahindra Airvan, will "continue to grow the Eclipse market across Asia", says general manager Zhang Mingding.

Alan Klapmeier, chief executive of One Aviation, says there is "untapped sales potential" for very light jets in China, and is confident the twinjet will receive Chinese validation "in the near future".



Jinggong General Aviation has signed up to market the very light jet

The company, created by the merger of Kestrel Aerospace and Eclipse Aerospace earlier this year, has been expanding its global network of distributors.

In July, it appointed Jet Lounge in the Netherlands as its second European distributor. It is already represented in the region by Aeris Aviation of the UK. ■





ادنوك  
ADNOC



## ADNOC AVIATION

### Reliability, Efficiency & Convenience

أدنوك للتوزيع ص.ب. ٤١٨٨، أبوظبي - الإمارات العربية المتحدة، هاتف: ٢ ٦٧٧١٣٠٠ (+٩٧١)، فاكس: ٢ ٦٧٢٢٣٢٢ (+٩٧١)

**ADNOC Distribution** P.O. Box: 4188, Abu Dhabi, U.A.E., Tel.: (+971) 2 6771300, Fax: (+971) 2 6722322

أدنوك للتوزيع  
ADNOC Distribution

**800 300**  
Let's Talk لننواصل  
[adnocdistribution.ae](http://adnocdistribution.ae)



**INCOME** STEPHEN TRIMBLE WASHINGTON DC

## Embraer revenues bolstered by business aviation

**E**mbraer boosted its revenues from executive jet sales by almost 100% in the third quarter of this year thanks to a doubling of deliveries, to 30 aircraft.

Revenues for the segment rose from \$213 million in the same period of last year to \$402 million this year.

Commercial jets also came up trumps for the Brazilian manufacturer, with revenues rising by 4.2% compared with the first quarter of 2014, on deliveries up two from last year at 21.



Embraer has delivered its 300th Phenom 300 light jet

Those improvements helped Embraer to offset the effect of sharply lower revenues from the Defence and Security segment,

where its sales plummeted from \$346 million in the third quarter a year ago to \$182 million this year. Its KC-390 tanker-transport

resumed flight tests on 26 October, following an eight-month pause.

Overall, Embraer's operating earnings increased by 15% to \$158 million.

Also, Embraer Executive Jets marked its 300th Phenom 300 delivery on 15 October, with the aircraft handed over to an undisclosed US customer at its facility in Melbourne, Florida. The light jet has been the most-delivered business jet in the world for the past two years. ■

**PROPULSION** STEPHEN TRIMBLE WASHINGTON DC

## Silvercrest schedule slips into 2017

Further engine flaws expected to take Snecma up to 18 months to address on the back of a series of programme delays

**S**neecma requires another 12-18 months in order to correct more flaws found in the Silvercrest engine selected to power the Dassault Falcon 5X and Cessna Citation Longitude.

The Safran subsidiary is working to tighten clearances around the compressor blades to stop air

from leaking from the flowpath into the combustor, Safran chief executive Philippe Petitcolin told analysts on a third quarter earnings call on 22 October.

"These things happen," Petitcolin says. "We know what to do. We just have to do it. But it's going to take a little time and money."

The company's internal target to resolve the problem is 12 months, he says, but the maximum time that may be necessary is 18 months. That means engine certification could be further delayed, to early 2017.

The clearance problem within the compressor means that the engine is not yet meeting the company's target for fuel burn reduction, Petitcolin says.

Snecma has advertised that the 9,000lb-thrust to 12,000lb-thrust Silvercrest engine will be 15% more fuel efficient than comparably-sized engines today, which include some versions of the GE Aviation CF34 and Rolls-Royce AE3007.

But the Silvercrest compressor module features a unique configuration. In most turbofan engines in the Silvercrest's thrust class, air flows backward from inlet straight – or axially – through the compressor until it enters the combustion chamber.

The Silvercrest features four stages of axial compression and a fifth and final stage of centrifugal compression, meaning that the air is channelled to the sides of the fan case before flowing into the combustor. In order to design and build the centrifugal stage,

Snecma tapped up its sister Safran subsidiary Turbomeca, which uses such designs routinely in usually less powerful turboshaft applications.

Snecma launched development of the Silvercrest in 2006, but has recently faced a series of delays. There were first problems integrating the engine on Snecma's flying testbed, which delayed the schedule by several months. An oil-fuel heat exchanger issue also forced the programme to wait for months, while the part was redesigned and recast.

So far, the delays are not expected to change the schedule for one of Silvercrest's customers. Textron Aviation plans to announce an update on the Longitude schedule at the NBAA convention starting on 17 November, but the company says "we do not anticipate this impacting the schedule of the programme".

But Dassault says the delay would impact certification and delivery for the 5X, previously set for mid-2017. The French manufacturer says that it expects to know what the revised Silvercrest schedule is by the end of this year, and will share new delivery dates with customers in early 2016. ■



The powerplant is set for the Falcon 5X and Citation Longitude





Spending power  
FEATURE P46

SAFETY DAVID LEARMOUNT LONDON

# How accident investigation is evolving

After a century of activity, the work performed by the AAIB's specialists is changing – with new technologies playing a part

**A**ir accident investigation still has the same objectives that it ever did, but contemporary techniques, advanced aircraft technology and changing attitudes to the dissemination of information have massively altered the way it is carried out.

On 14 October at the Royal Aeronautical Society in London, the UK Air Accidents Investigation Branch (AAIB) used the occasion of its own centenary to review the accident-investigation task of today.

The AAIB's chief inspector of air accidents, Keith Conradi, notes that now, immediately following an accident, aircraft manufacturers are hungry for data to indicate whether corrective technical action is required. Meanwhile, a 24h media machine also needs to be provided with verified data as soon as possible, because it has so many other valid – if unofficial – sources of data available, ranging from commercial flight-tracking services to social media.

## INSTANT EVIDENCE

All this is reflected in an AAIB synopsis of some of the most obvious changes in what happens now at an accident site. "Evidence was once a collection of notes and a few sketches in an investigator's notebook, together with dozens of 'bagged and tagged' items for further investigation," it observes. "Now, personal electronic devices have made capturing evidence simple. Gone are the days of brown paper tags, sealing wire and wax. Today, managing evidence is about databases, bar codes and photographic recording of the evidence as it is moved from one investigation venue to another, or as its state or physical condition is altered. The integrity of the evidence must be preserved if the outcome of the investigation is to be credible," it adds.

It was only a year ago that the AAIB obtained its first remotely controlled unmanned air vehicle with an advanced photographic and recording capability.



AAIB personnel were called into action following a fatal crash at the Shoreham air show in August

Conradi says that such systems have huge potential to aid investigation at all sites, but particularly at those that are difficult to access. The AAIB's first investigatory UAV was a DJI Phantom 2 Vision, obtained in April 2014, but after a trial period the agency upgraded to the Phantom 2 Vision Plus, which is equipped with a gyro-stabilised camera.

A different approach to investigation is also demanded by the technical complexity of today's aircraft. This means that investigators have to depend, to a much greater extent, on the expertise of the aircraft manufacturer, while still retaining their independence and integrity. "We aren't experts in anything except accident investigation," Conradi notes. That is a rather modest statement, however, because he has 30 years of operational experience flying military jets and airliners, and most of his team are aeronautical engineers.

Even in human factors, the AAIB may need to seek expertise from outside its own ranks. It notes: "How do we add value to the human performance aspect of investigations? Do we need to spend more time investigating normality to truly understand the non-nor-

mal? Current practices for accident and incident investigation often are not designed to enable diagnoses of underlying or latent factors that are increasingly recognised as important contributors to safety risks, including organisational culture, regulatory factors, equipment design, procedures, and other factors behind the 'why' of human error."

## SAFETY VERSUS JUSTICE

Conradi says that in accident reports, at least some emphasis should be given to how crew members deal with problems when they are successful – and not only when they fail. Increasingly important among the work that the agency does, he emphasises, are the studies of serious incidents that stop short of becoming fully fledged accidents. "This is where a lot of our future investigation will be," he predicts. The AAIB has worked with the European Civil Aviation Conference – the European regional office of the International Civil Aviation Organisation – on understanding "what went well" in incidents, as well as what went awry.

The AAIB also highlights the "challenges faced by states in striking the balance between the need for the protection of safety

information (to improve safety) and the need for the proper administration of justice by judicial authorities". This has required that "relevant regulatory tools are progressed quickly", it notes.

Even in the EU, the issue of interface between the technical investigation and judicial interest varies in cases from one national jurisdiction to another, but Conradi says Europe is successfully engaged in guiding due process in this arena: "The main drivers to repeal Directive 94/56/EC and to adopt Regulation (EU) No 996/2010 were to strengthen the investigating capacity of the Member States, to clarify the role of the European Aviation Safety Agency, to ensure separation between accident investigation and judicial proceedings, to strengthen implementation of safety recommendations and to better protect the rights of the victims of air accidents and their relatives."

Over more than a decade, Europe has gradually been blazing a trail towards establishing an acceptable legal and technical due process, whereby the two parallel investigatory systems can go on uninterrupted without fouling the other. It is not perfect, but Conradi believes it is getting there. ■



# SPENDING POWER

Whether in terms of military procurement, civil airliners or business aviation, the Gulf remains one of the largest markets for aerospace. The region's aviation infrastructure is expanding fast too. We set the scene for the big themes at the upcoming Dubai air show





**Main picture:** a Eurofighter Typhoon flies over Abu Dhabi: the UAE assessed it and the rival Dassault Rafale, but in the end opted for neither. **Top:** Abu Dhabi's new Midfield terminal, one of several big airport developments in the region. **Above:** ECFT is expanding training in Dubai

## CONTENTS

- 48 **Airbus** Sizing up its strategy
- 52 **Boeing** Long-term game
- 52 **Low-cost airlines** Rival strategies
- 54 **Airports** Growing the gateways
- 57 **DAE** Emerging smaller but stronger
- 58 **Training** ECFT expands its bays
- 59 **Fighters** Dealing with new threats
- 62 **Spaceflight** UAE's starry vision
- 63 **Business aviation** All about building
- 64 **ATM** Controlling the crowded skies

AIRBUS

# Sizing up to Boeing

In the run-up to Dubai, Airbus has been deciding on its riposte to the 777-9X, with speculation over two possible developments

MAX KINGSLEY-JONES LONDON

As Airbus begins assembly of its largest twinjet to date, the A350-1000, it faces a crucial decision about whether to add an even bigger version to its armoury to enable it to go head to head with the Boeing 777-9X.

Toulouse's strategy in the "big-twin" sector is just one of the potentially life-changing decisions it is facing, as the time is coming for it to "put up or shut up" about a re-engined – and perhaps slightly larger – version of today's A380-800.

Official details about both projects, dubbed "A350-1100" and "A380neo", are sketchy, as is any official clarity on where Airbus is in its decision-making processes. It is also not clear whether a decision to launch one or other project is mutually exclusive.

When pushed, Airbus executives have spoken about both potential developments, but have generally played their cards close to their chests.

At last year's Singapore air show, the manufacturer's chief executive Fabrice Brégier left the door open to a competitive response to the General Electric GE9X-powered 777-9X, saying that while the -1000's 360-passenger seat count was the "sweet spot" and there was "no short-term/mid-term plan to do [a stretch]... we could well envisage additional

members of the A350 family".

When launched, the Rolls-Royce Trent XWB-powered A350 XWB was planned as a three-aircraft family with the -900 as the initial and baseline variant from which the -1000 stretch and -800 shrink were to be adapted. But as the A350 has proceeded through definition, the -1000 was redesigned to provide greater capability with a revised version of the Trent XWB offering more thrust than when the largest A350 variant was first envisaged. Meanwhile the -800 has effectively been abandoned in favour of re-engining the A330.

Speaking during this year's Paris air show in June, Airbus's chief operating officer for customers John Leahy said that the -900 was no longer the A350's centre of reference, but that this middle point has "moved toward the -1000".

## DEMAND FOCUS

Rather than a "double-stretch" strategy for a new development of the -1000 – about which Leahy has been sceptical – he said that a larger version of the -1000 might be closer to "one and a half".

Leahy confirmed at Paris that work was under way to establish the level of demand for a larger variant, saying that Airbus must "be sure the market is asking for 40 more seats". He has often stated Airbus's view that the main driver behind Boeing's decision to offer the 777-9X as a 400 seater (34 seats more than the A350-1000) is to allow it to offer competitive seat/mile costs.

Airbus is already working to raise capacity on the A350-900 and -1000 by up to 20 seats within the next five years. But Leahy said that the possibility of a development beyond the -1000 is a subject of early discussions with operators as well as internal analysis.

Also during Paris Airbus indicated that an



Qatar Airways is interested in an A350 stretch

## A350-1000 VS 777-9X

|                  | A350-1000     | 777-9X  |
|------------------|---------------|---------|
| Length (m)       | 73.8          | 76.3*   |
| Span (m)         | 64.8          | 71.8    |
| MTOW (t)         | 308           | 352*    |
| Passengers       | 366           | 400     |
| Range (nm)       | 7,950         | 7,600   |
| Engines          | R-R Trent XWB | GE GE9X |
| Thrust (lb)      | 97k           | 105k    |
| Firm orders      | 169           | 243     |
| Customers        | 9             | 6       |
| List price (\$m) | 352           | 400     |

\*estimated SOURCE: Manufacturers/Flightglobal's Fleets Analyzer database (Oct 2015)



A larger version of the A380 could be based on the Trent XWB powerplant

A380 stretch was being floated to airlines in parallel with the proposed re-engining that would probably incorporate four additional fuselage frames – an extension of around 2.5m (8.2ft). Leahy said such a "mini-stretch" would enable around three more seat rows in the economy-class cabin and one in business class.

## MARGINAL GAIN

Such an increase would raise seating by around 36-54 seats, to around 580-600, depending on the layout. This is considerably less than the previously proposed A380 growth variants – the original "A380-900" was envisaged as a 650 seater.

While no firm information is available on the likely powerplant for the re-engined and/or stretched A380, there is speculation that it could be based on the A350's Trent XWB. This engine has already been flown on an





A380, as one of Airbus's development aircraft serves as a flying testbed for the engine.

According to Flightglobal's Fleets Analyzer database, Airbus holds 169 firm orders for the A350-1000 from nine customers, with the first delivery – to Qatar Airways – due to take place in early 2017. Meanwhile, Boeing has racked up 243 orders from six customers since it formally launched the 777-9X at the 2013 Dubai air show with the backing of Emirates, Qatar Airways and Etihad Airways. It also holds a further 53 orders for the shorter, longer-range -8X as well as for 10 where the variant has not been specified, putting total 777X orders at 306.

Although Airbus is vague about whether it will stretch the A350, others are more certain about the likelihood of such a development.

Qatar Airways – already launch customer for all the existing A350 variants – is interested in a stretch, but only if it offers enough of a step over the rival 777-9X. Chief executive Akbar Al Baker tells Flightglobal that he believes Airbus must develop a larger A350 to compete effectively with Boeing, and says his airline is a potential customer.

"We would be interested in a stretch of the A350-1000. Airbus has no alternative – to be competitive it will have to do something that is bigger and better than the 777-9X," he says.

Airbus's main rival also expects a competitive response and has taken such a development into consideration when developing the 777X, says Boeing's marketing chief Randy Tinseth: "It's hard for me to believe they wouldn't do something. Because I don't think they can live with being outsold four or five to one in that segment of the market."

**"It will be a challenge to deliver the '-1100' with sufficient range to challenge the -9 on range"**

**ROB MORRIS**

Head of consultancy, Ascend

Tinseth adds that Boeing can handle any threat from Toulouse as it was "something we contemplated early in the process. We really like what we have with the -9. It helps when you are out there with 300-plus orders."

Rob Morris, head of Flightglobal's consultancy business Ascend, believes the "A350-1100 could be an elegant way to plug the gap" in the Airbus product line between 350 and 550 seats. But Airbus might want to see the -1000 fly, and maybe even the -9X, to have an idea of their relative weight and performance, he says.

"In real airline layouts, the A350-1000 will likely have 330-340 seats and the 777-9 370-400, giving it around 30-50 more seats," says Morris. "Yet, the A350-1000, being an all-new design, may well be 30t lighter. So it's entirely possible the two aircraft will be very close on seat-mile costs."

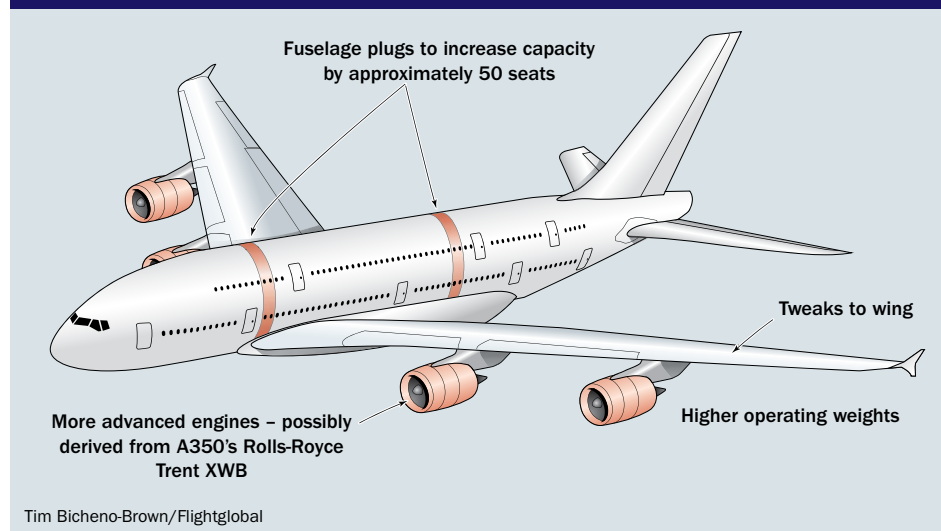
#### COMPLEMENTARY TYPES

Morris points out that Cathay Pacific has ordered both types, illustrating that the two are complementary "and not all airlines or routes will need an aircraft of higher capacity than the 777-300ER".

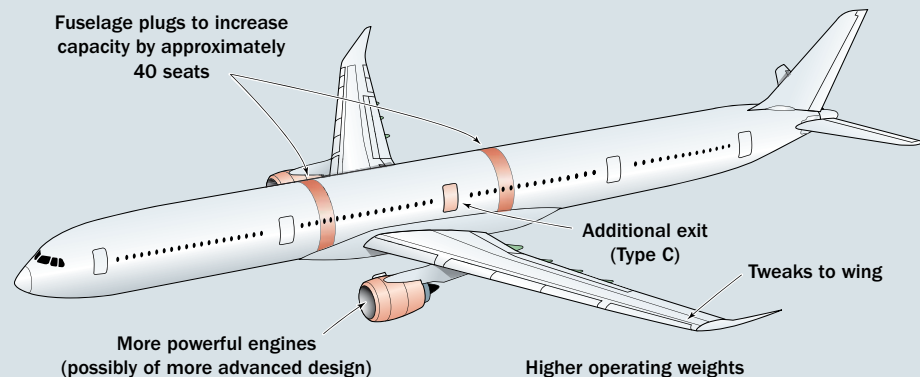
However, he adds that if the 777-9X starts "cleaning up, then an A350-1100 could be Airbus's reaction. But clearly it will be a challenge to deliver the '-1100' with sufficient range to challenge the -9 on range with a further A350 stretch. So it must be careful not to end up with a compromised design that appears to offer a 350-400 seat solution but actually doesn't deliver the payload/range performance airlines would require."

Richard Aboulafia, vice-president of analysis at Teal Group, believes it is only worth Airbus attempting an A350 stretch if "they can do a derivative that gets most of the way to the 777-9X level. I doubt they can, but it largely depends on Rolls-Royce. Or, if the Rolls exclusivity agreement [on the -1000] doesn't apply to a growth version, then it depends on the engine guys in general."

#### A380NEO – POSSIBLE CHANGES OVER A380-800



### A350-1000 "STRETCH" – POSSIBLE CHANGES OVER A350-1000



Tim Bicheno-Brown/Flightglobal

» Neither Airbus nor R-R will comment on the specifics of their A350-1000 powerplant agreement. Aboulafia wonders what ties GE has with Boeing on the 777X. "And would Pratt have any interest in a 105,000lb thrust engine? If it is Rolls, can they match GE?"

Qatar Airways' Al Baker says the A350 stretch will need to incorporate "new engine technology" and doubts that the twinjet's existing Trent XWB engine could be adapted for the larger variant as the powerplant "is already at its fullest" for the A350-1000.

#### COMPETITIVE EDGE

Despite having a large commitment for the 777-9X, Al Baker can still see a role for a larger A350 in the Qatar Airways fleet, should it offer sufficient performance: "It would be bigger than the -9X and we believe it will have a superior fuel burn," he says.

While Al Baker says he has no interest in a re-engined A380, this aircraft has long been the hobby horse of the ultra-large airliner's biggest advocate – Emirates Airline president

**"Airbus has no alternative – to be competitive it will have to do something that is bigger and better than the 777-9X"**

**AKBAR AL BAKER**

Chief executive, Qatar Airways

Sir Tim Clark. He has been clear in his view that Airbus can create an outstanding "efficient seat-production machine" by bolting on some advanced technology engines and perhaps a slight stretch – Clark would have rather Airbus had built the larger "A380-900" variant in the first place.

Describing the current A380 as "the most profitable aircraft" in the Emirates fleet, Clark says the airline "could convert some" of the 50 Trent 900-powered A380s ordered

#### A350-1000 ORDERBOOK

| Customer        | Orders     |
|-----------------|------------|
| Air Caraibes    | 3          |
| Air Lease       | 5          |
| Asiana Airlines | 10         |
| Japan Airlines  | 13         |
| British Airways | 18         |
| Etihad Airways  | 22         |
| Cathay Pacific  | 26         |
| United Airlines | 35         |
| Qatar Airways   | 37         |
| <b>Total</b>    | <b>169</b> |

SOURCE: Flightglobal's Fleets Analyzer database (Oct 2015)

in 2014 to the re-engined variant. He suggests that a combination of weight reduction, aerodynamic clean-up and a new engine could generate an economic improvement in the 10-13% range.

"If they manage to do that, the performance of the aircraft will be stellar," says Clark. However, he does not expect Airbus will launch an A380neo at the Dubai air show.

But whether or not it commits to a re-vamped A380, Airbus concedes it needs to start growing the A380 orderbook. Fleets Analyzer shows that of the 317 firm orders placed for the A380 to date, the backlog now stands at 146 aircraft – of which 73 are for Emirates.

Brégier, speaking at the Paris air show in June, suggested that the manufacturer might have "launched the A380 a bit early", but said he believed that the market for an aircraft of its size was gradually emerging.

Richard Evans, who is senior consultant at Ascend, says the combination of sluggish sales along with deferred orders and some customers now unlikely to take delivery means Airbus has "limited options with the A380, and a neo may be the most palatable way to re-energise sales. The other would be to do nothing and perhaps allow the programme to wither on the vine."

**"Would Pratt have any interest in a 105,000lb thrust engine? If it is Rolls, can they match GE?"**

**RICHARD ABOULAFIA**

Vice-president of analysis, Teal Group

Evans says that timing-wise, the A380neo seems to fit: "After the A350-1000 development and entry into service in 2017, what is Airbus's next project in the early 2020s?" he asks.

Teal's Aboulafia sees the A380neo as "a great test for Airbus" and hopes and expects Toulouse will make the right call, which is to let the A380 die.

"If it walks away from the programme, Airbus has truly become a modern, free market company. If it launches the A380neo, it is still rooted in the vaguely embarrassing past, when politics determined programme launches and the company had little hope of determining its own future."

Aboulafia says he likes how Airbus is run these days, which gives him every confidence that the A380neo will be consigned to the "Museum of Seriously Bad Ideas".

"So...would I choose the A380neo or a growth A350?" asks Aboulafia. "For me, it's the choice between a smart move and a decision to pull their neckties really tight until they choke. Not much of a choice."

The elephant in the room for Airbus is what happens in the so called "middle of the market", the sector where the 757 and 767 have existed and one that Boeing has been very publicly evaluating for some time now. Airbus is confident it has the right product with the re-engined A321neo, but Boeing could respond with an all-new – and potentially radical – design.

#### MIDDLE GROUND

Morris says that if the A350-1000 is able to hold its own against the 777-9X and take "a decent share of the market – perhaps 50% in combination with the A380 – then Airbus's attention could be more on the middle of the market space".

Aboulafia says that if Boeing comes up with a competitive product in response to the A321neo and to satisfy the middle of the market requirement, then Toulouse will have to react: "Thus, another reason to let the A380neo die on the vine is that Airbus needs the resources to both defend the middle market and fight off the 777-9X challenge," he says.

With so much to play for, and some crucial strategic moves still to crystallise, the civil manufacturing sector is entering a fascinating and potentially game-changing period. Watch this space! ■





**The difference is monumental.**

We're beating our commitment on improved fuel burn efficiency, now exceeding **16%**. Just the kind of ongoing improvement we told you to expect from our PurePower® Geared Turbofan™ engine architecture. Learn more at [PurePowerEngines.com](http://PurePowerEngines.com).



**PurePower Geared Turbofan Engines**



**Pratt & Whitney**  
A United Technologies Company

**BOEING**

# Playing the long game

Seattle is unlikely to repeat its success in terms of orders at the 2013 show, but the Middle East remains a key marketplace

**STEPHEN TRIMBLE** WASHINGTON DC

**D**ubai's last major air show in 2013 set a high bar for order expectations. In the span of less than three hours on the first day of the show, Emirates, Etihad Airways and Qatar Airways signed orders and commitments for a total of 225 Boeing 777X aircraft. Etihad added another order for 30 787-10s. Not least, Flydubai committed to buy up 100 737 Max and 11 737NGs. If any region could repeat such an epic haul of orders, it would be the Middle East.

But Boeing's chief salesman, John Wojick, is careful not to raise expectations. Boeing enters the Dubai air show with no new products to launch, quite unlike the 2013 event with the formal unveiling of the 777X family and the recent launch of the 787-10 only five months earlier.

The Middle Eastern carriers are always capable of pulling last-minute surprises, but regional executives are also being careful about managing expectations. The most visible competition in the region – pitting the 787-10 against the Airbus A350-900 for an Emirates Airlines deal – will not be decided until next year.

The Dubai air show is never quiet on the orders front, but this year it will certainly be

quieter than 2013.

The focus for Boeing's sales team is instead on emphasising the region's long-term potential, despite a host of political, economic and security problems. After all, this is a region that invented a new business model, connecting passengers flying between Asia and Europe and Asia and North America, amid a series of regional conflicts and wildly fluctuating fuel prices over the past three decades.

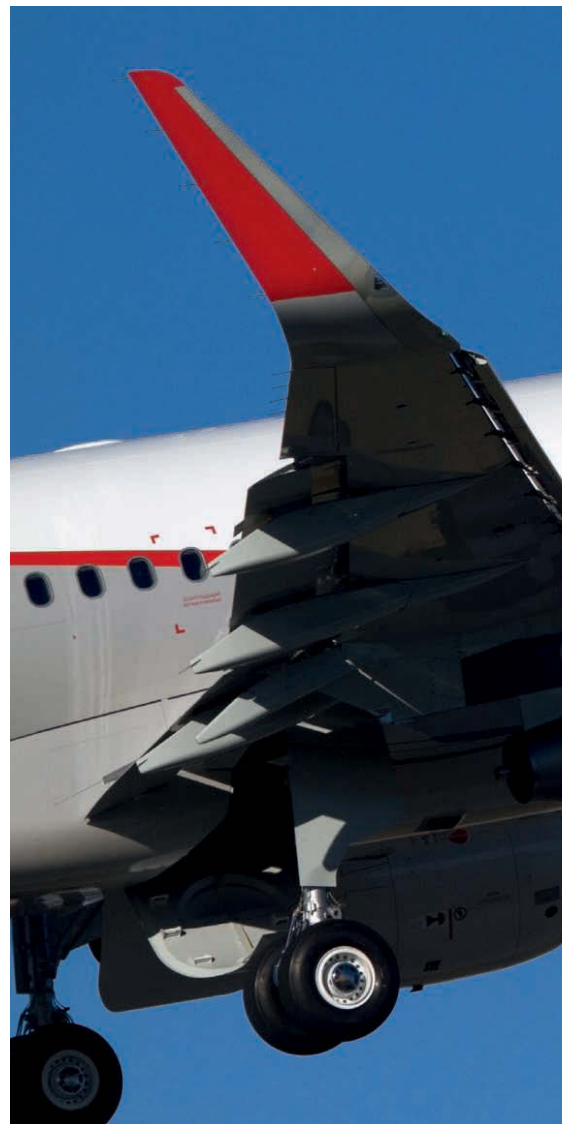
"The whole marketplace that they've created is really quite phenomenal, connecting people from all over the world, creating traffic patterns that I don't think anybody else has envisioned," Wojick says.

## INTERESTING TIMES

The two years since the last Dubai air show have been typically eventful. Since 2013, the region has witnessed the rise of the Islamic State, a stand-off with Iran over nuclear weapons, a sharp reduction in oil prices and recent calls by US airlines to counter the rapid growth of Middle Eastern airlines with new restrictions on Open Skies trade deals.

In spite of all that, Boeing's optimism about the region's future continues to grow. The company's latest 20-year market forecast anticipates the region will buy 3,180 new aircraft worth \$730 billion over the next 20 years. The Middle East region already has 1,052 aircraft on firm order already, including regional jets, according to Flightglobal's Fleets Analyzer database.

The region's role as an intercontinental connector is reflected in the fleet split shown in Boeing's commercial market outlook, with 1,400 single-aisles along with 880 medium widebodies, 560 small widebodies and 300 very large aircraft. ■



**AIRLINES**

# Air Arabia v Flydubai

The UAE's two budget airlines compete for many of the same flyers, but they have adopted very different low-cost strategies

**MURDO MORRISON** SHARJAH & DUBAI

**T**he UAE, with a population of less than 10 million, is home to no fewer than four major airlines. While the flag carriers of Dubai and Abu Dhabi – Emirates and Etihad – enjoy global profiles, the country's two low-cost, short-haul airlines have also established themselves as major forces in Middle East aviation. And with aircraft on order and aggressive route expansion programmes, Air Arabia and Flydubai are still far off peaking.



The 2013 show was the launchpad for the 777X, netting the airframer 225 orders





Air Arabia has seven more Airbus A320s due to arrive before the end of 2016

The two budget carriers have much in common. Both launched this century, they have similar-sized fleets and, true to the low-cost carrier rulebook, each sticks with one type: Sharjah's Air Arabia operates 41 Airbus A320s and Flydubai 50 Boeing 737-800s. With bases – at Sharjah's modest airport and Dubai International's bustling terminal two – less than a 30min drive apart, and many shared destinations, they vie largely for the same demographic.

However, when it comes to business models, Air Arabia and Flydubai have taken somewhat different paths. Publically-listed Air Arabia was the region's first low-cost carrier and has stuck most rigorously to the no-frills philosophy with one-class cabins – albeit 168 seats with a generous 32in pitch. Since setting up in 2003, it has established three overseas units – Casablanca, in Morocco; Alexandria, in Egypt and Amman in Jordan, as well as, in May this year, the UAE emirate of Ras Al Khaimah.

Flydubai, by contrast, has taken its product substantially upmarket since launching in 2009, first introducing seat-back screens and



**Al Ghaith: We could reach 100 aircraft**

then in 2013 a business-class section with three rows of four 21in-wide seats, pitched at 42in. Unlike its rival, it has not opened overseas subsidiaries, but since October this year it has been offering 70 flights a week from

Dubai's second airport, the new Dubai World Central, to destinations it already serves from Dubai International.

#### CHANGE FOCUS

Flydubai's chief executive, Ghaith Al Ghaith – a long-serving Emirates executive before moving to run the start-up – justifies the move to a more hybrid model. “We had to react and change,” he says, adding: “It is not a case of one product fitting all. Our customers require segmentation and there is nothing wrong with that.”

His counterpart at Air Arabia, Adel Ali, simply argues: “You are either low-cost or not low-cost. Where do you draw the line? You end up confusing yourself and the customer.”

The two airlines' fleet expansion plans will also take them in different directions. After taking delivery two months ago of its 50th and final aircraft from an initial order placed at Farnborough in 2008, Flydubai will in May welcome the first of 11 more 737-800s, ordered, along with up to

---

**“Our customers require segmentation and there is nothing wrong with that”**

---

**GHAITH AL GHAITH**

Chief executive, Flydubai

100 737 Max aircraft, at the 2013 Dubai air show. The Max versions will be delivered between 2017 and 2023 and take the fleet towards treble figures by the end of the decade, factoring in replacements.

For Al Ghaith, the biggest constraint on growth is not competition or sluggish demand but lack of traffic rights to fly into certain foreign airports. “Tomorrow, if the dynamics of the bilaterals become more clear, we could double in size,” he says. “We now have 50 aircraft and our next milestone is 75 by 2020 or maybe before. Then a fleet of 100 is not too far away, but we may reach a point where we would need a break in the bilateral regime. If we had rights we could reach a fleet of 100 easily.”

Air Arabia, on the other hand, is on a slower growth trajectory, but will opt for either A320neos or Max aircraft for the next stage in its expansion. The airline has seven more A320s to arrive before the end of 2016 and four in 2017, but Ali insists he is “open minded” about the next-generation choice. “We are in dialogue with both manufacturers and happy to not to rush things,” he says. “It will probably not be too far in the future, maybe 2016, before we wrap things up.”

Flydubai serves 94 cities – 59 of which did not previously have a direct link to Dubai. It introduced 27 routes in 2014 and will bring on

» another 19 this year. Its biggest markets are Saudi Arabia, with 14 destinations, and Africa, where it serves 12 points. Also popular are Russia, as well as eastern Europe, and the Indian subcontinent. “Our philosophy is that we fly to places that aren’t properly served, linking the region to Dubai,” notes Al Ghaith.

### INDEPENDENT STRATEGY

However, while Air Arabia has Sharjah to itself, Flydubai is dwarfed at the world’s busiest international airport by its big sister, based in the vast terminal three. Al Ghaith insists Flydubai and Emirates operate separately with no consultation on whether destinations should be served with a Flydubai 737 or Emirates widebody – indeed there is a route overlap of 36 cities. “Our route strategy is totally independent,” says Al Ghaith. “We don’t sit down with them and plan our routes.”

**“You are either low-cost or not low-cost. Where do you draw the line?”**

**ADEL ALI**

Chief executive, Air Arabia

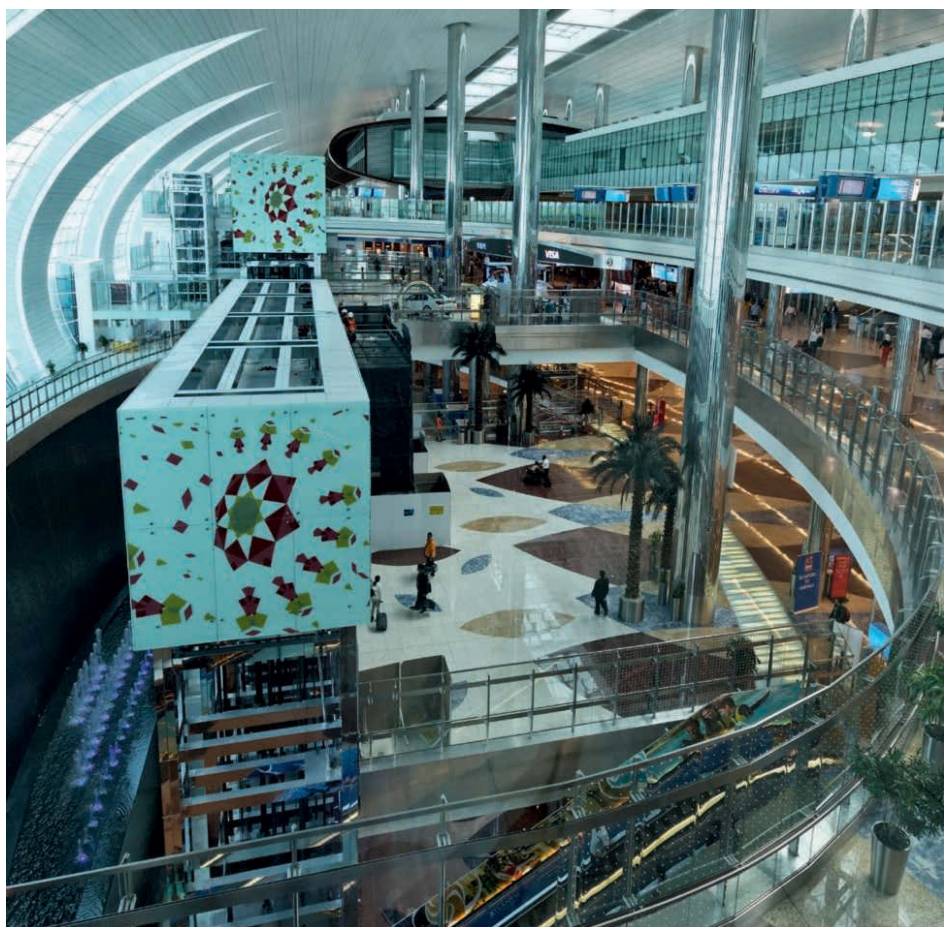
The contrast between Flydubai’s modest offices next to terminal two and Emirates’ plush headquarters facing the other side of the airport reinforce the impression that the smaller airline is very much a low-cost carrier with a wary eye on the bottom line. When he launched the new carrier, Sheikh Ahmed Bin Saeed Al Maktoum insisted Flydubai would not be “Emirates lite” but have very much its own identity and have to “stand on its own two feet”, recalls Al Ghaith.

While Air Arabia’s multi-base, joint-venture strategy has allowed it to extend its brand and reach from western China and Russia to western Europe and well down into Africa, it has presented Air Arabia with challenges, with tourism to Egypt and Jordan hit by domestic unrest and the spillover from the Syrian crisis. However, its Moroccan operation, where five A320s are based, is going “from strength to strength”, says Ali, thanks to robust European traffic.

Expansion southward into French-speaking west Africa also offers much potential. “We are in dialogue to allow us access,” says Ali. “Morocco is a gateway and business hub for West Africa.” Max or Neo aircraft will also allow Air Arabia to develop longer routes into Europe, Africa, Russia and China from Sharjah and Amman. “It could add 800-900km to where we can fly,” says Ali. “If [the aircraft] do what [Airbus and Boeing] say they can do, it will be good for us.” ■



For a profile of Ghaith Al Ghaith and other Airline Business cover interviews, go to [flightglobal.com/interviews](http://flightglobal.com/interviews)



Forecasts of Dubai International’s capacity limit have had to be revised upwards

### AIRPORTS

## Global gateways

The hubs of each of the big three Gulf airlines are undergoing major expansion as they compete to connect the world

**MURDO MORRISON** ABU DHABI & DUBAI

**A**irport investment is in overdrive at aviation’s busiest global crossroads, as the hubs of Emirates, Etihad and Qatar Airways vie to keep pace with the growth of their flag-carriers and each other to attract international air traffic. While Doha’s new Hamad International is about to embark on an expansion that will take throughput to almost 70 million passengers by 2020, Abu Dhabi is close to transforming its airport with the completion of its giant new Midfield terminal.

Meanwhile, Dubai is trying to squeeze more capacity out of what is now the world’s busiest international airport before its multi-runway Dubai World Central replacement comes fully on stream in the mid-2020s. Such

is the growth of Emirates, that existing plans by Dubai Airports to restrict Dubai International’s capacity to 90 million have already been scrapped as it looks for innovative ways to accommodate nine-figure passenger numbers within a relatively tight piece of land.

Although no other Gulf carriers have aspirations to join the big three club, elsewhere in the region airport expansion is under way. In Oman, Muscat International’s new terminal will open in early 2017, nearly doubling capacity to 12 million. Further down the coast, Bahrain is inviting bids for a contract to build a terminal able to handle 14 million passengers by 2030, a 75% increase on what the airport handles today, while Kuwait is also planning to develop a new passenger terminal.

### RAPID PROGRESS

Two years ago, Abu Dhabi’s Midfield terminal was a hole in the desert between the airport’s two runways, with only cranes and construction traffic visible from the nearby highway to Dubai. Since then, a 60m (197ft)-high structure has risen from the ground and is about 70% complete. Due to open at the end of 2017, the 65-gate terminal – eight gates Airbus A380-compatible – will more than double capacity at the airport to 45 million passengers.

The six-storey building will serve as a hub





# STRAIGHT TO THE FUTURE

Finmeccanica is a industry leader in aerospace, defence and security; bringing proven technology, global experience and innovation to customers worldwide.

[finmeccanica.com](http://finmeccanica.com)





» for Etihad and its partners, with other airlines moving to the existing terminals one and three, which will be connected by a road tunnel. The architecture of the 65m-high edifice is impressive, with a curved roof suspended on arches giving the impression that it is floating, and each of the four piers with its own colour scheme. Sulaiman Siksik, chief project officer for ADAC, describes it as “one of the most complex buildings ever designed”.

### “Growth has exceeded expectations. Every time we re-forecast, we revise up”

**PAUL GRIFFITHS**

Chief executive, Dubai Airports

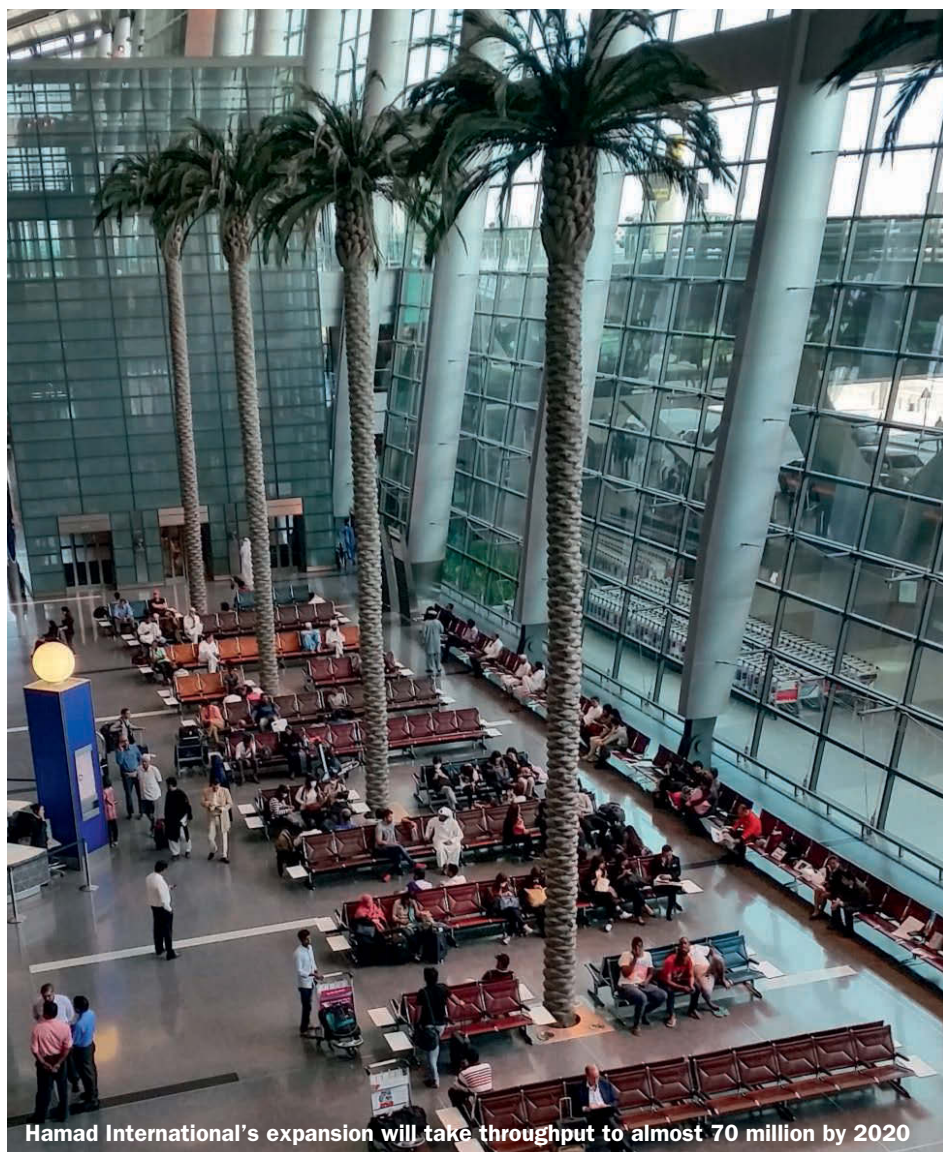
The main purpose of the Midfield terminal is to impart a seamless experience to Etihad’s passengers, particularly those on premium tickets, says Siksik. There will be up to eight lounges as well as an airside hotel. As with the other Gulf connectors, the majority of Etihad passengers are transiting, and the airline is committing to a minimum connecting time of 45min between gates. Long term plans include the addition of a satellite terminal.

While Abu Dhabi’s plans for its international airport are ambitious, its neighbour Dubai’s dreams remain almost off the scale. A decade ago it began building – just an hour’s drive north of Abu Dhabi International – what was intended to become by the early 2020s the world’s biggest passenger and freight hub. Dubai World Central (DWC) would comprise a six-runway airport surrounded by a new city in the desert south of Dubai, connected to the Jebel Ali port and free zone.

The city’s financial crisis of 2009/2010 slowed the project, but DWC has slowly come to life. It has become the main cargo airport for Dubai and one of the world’s top 20 freight hubs. Also, following the opening of a passenger



**Griffiths: DWC has yet to fulfil potential**



**Hamad International’s expansion will take throughput to almost 70 million by 2020**

terminal in 2012, several airlines have set up operations. They include Wizz Air, Qatar Airways and Gulf Airways. Even Emirates’ sister airline Flydubai offers 70 flights a week from there, to cities it also serves from Dubai International.

#### **SLOW GROWTH**

That said, DWC is still a long way from being the global gateway originally intended, as Dubai Airports chief executive Paul Griffiths concedes. Despite a planned extension to the terminal to take capacity to 26 million by 2017, it would have to grow another sixfold at least to be sufficient for Emirates to relocate its fast-growing operation to the new airport. “DWC has a gestation of 10 years, so moving Emirates there before 2025 is remote,” he says.

This leaves Dubai Airports with a quandary. Dubai International (DXB) became the world’s number one for international passengers in 2013, with numbers exceeding 70 million. Since then the figure has increased to “just shy of 80 million” – three quarters of it Emirates and

Flydubai. Even though freight and most business aviation traffic has been relocated to DWC, demand for space and slots threatens to outstrip what Griffiths and his team can provide.

“Growth has exceeded expectations. Every time we re-forecast, we revise up,” he says. “Everyone wants a slice of Dubai capacity.” Passenger numbers are in line to reach 100 million by 2020 – with a further 26 million using DWC – and Griffiths admits: “We’re scratching our heads to see how we can accommodate that. Our throughput is unprecedented. Per square metre of airfield, our throughput is of a different order of magnitude to most airports.”

New infrastructure projects will help. With its perimeter ringed with busy roads and buildings – many of which were there when Dubai was a small trading port – DXB cannot grow outwards. This has meant every available piece of land within the fence is used, with older buildings frequently dismantled to create more room. A new concourse, D, serving airlines using the 1970s-era terminal one,



will open around the turn of the year, and make things less crowded for passengers.

Another solution could be to persuade more second- and third-tier airlines – many of which use DXB's low-cost terminal two – to follow Flydubai's example and relocate at least some of their flights to DWC. "If you want slots at the moment, you can get them there," says Griffiths. "It's all about critical mass. Airline planners tend to be a conservative lot, but once they see others operating successfully there, they will be persuaded."

In Doha, Hamad International, which opened in mid-2014 after several delays, is getting into its stride, although Qatar Airways chief executive Akbar Al Baker – the airport's biggest user by far – admits there are still "teething problems".

### THINKING BIG

The development, 4km from the old Doha International, was highly ambitious, with 60% of the land on which it was built reclaimed from the sea, and designers expected to deliver on characteristically high expectations from its anchor tenant.

A second phase, about to begin, will add capacity, with new concourses taking passenger numbers from almost 29 million last year – including around six months during which Doha International was open – to beyond 35 million this year, says Al Baker, with Qatar Airways accounting for around 30 million of that number. The extension – designed by UK architect Sir Norman Foster – will take capacity to almost 70 million by the end of the decade.

With squash courts, sleeping lounges and a swimming pool as well as two 100-room air-side hotels and a shopping mall, Qatar has certainly set the bar high when it comes to Gulf airports. One newspaper has dubbed Hamad International "the most over-the-top airport in the world". However, Al Baker has simply said of his airline's new home: "I don't think there is any airport of this standard anywhere." ■



Midfield will double Abu Dhabi's capacity

### LEASING

## Learning to be leaner

DAE has survived the financial crisis and a dramatic scaling back of its ambitions to re-emerge as a specialist lessor, poised for growth

MURDO MORRISON DUBAI

Dubai Aerospace Enterprise (DAE) is a very different entity to the brash brand that launched itself on the industry a decade ago with the intent to create a series of blue-chip businesses in the Gulf and beyond. The dream was bold: in early 2006 – with its skyline full of construction cranes, rapidly expanding flag-carrier Emirates, and its international airport becoming a crossroads of the world – it seemed everything Dubai touched turned to gold.

By 2007, DAE had acquired one of North America's foremost maintenance, repair and overhaul companies as well as a flight-planning software business. In addition it had established the Gulf's first aviation university, set up a division to build and manage airports

**"The world changed. We had to readjust. We over-extended ourselves"**

**FIROZ TARAPORE**  
Chief executive, DAE

around the world, and – as part of a strategy of becoming one of the big hitters in aircraft leasing – announced deals for more than 200 Airbus and Boeing types.

But when the global financial crisis hit Dubai and its money-makers, DAE's ambitions unravelled; by 2010, most of the start-ups had been quietly shelved, leaving just North American MRO Standard Aero and a much more modest leasing operation, based largely on a sale and leaseback model. Now, following the divestment of \$2 billion-turnover Standard Aero in July 2015, the new DAE is focused on its core activity as a lessor with a fleet of 66 aircraft.

Competing as a niche player with lessors backed by international banks and industrial corporations may seem a strange outcome for a company that once vowed to take on the world. But chief executive Firoz Tarapore says DAE is poised to grow again, albeit as a more scaled-back enterprise to the one seen nine years ago. "That era is a distant memory," he admits of DAE's early years. "The world changed. We had to readjust. We over-extended ourselves."



Tarapore aims to double net book value

Speaking at his office in Dubai's new financial district, Tarapore says DAE is comfortable as a specialist lessor, albeit one with aspirations to be larger. The sale of Standard Aero to a US private-equity concern – terms were not disclosed – has created options. "It gives us a very large pool of capital which we are now looking what to do with," he says. "We want to invest in a growing leasing sector to get to two times the size we are today. We think we can get there in three or four years."

Tarapore says DAE does not rule out investing in "a new set of aerospace businesses that can bring a strategic connection to Dubai" – although any acquisitions would be in services rather than manufacturing. However, the focus is likely to be on organic growth of the leasing operation. This comprises ATRs through to Boeing 777 freighters and, according to its annual results for 2014, DAE had a net book value for its aircraft portfolio of \$3.6 billion – a 50% increase over three years.

### SPECULATIVE VENTURE

"Not long ago, our portfolio was \$2 billion and we said we needed to get to \$4 billion to have scale," says Tarapore. "We are now at \$4 billion, and if we can get to \$8 billion, that takes us to a slightly different scale." Most of DAE's latter deals have been sale and leasebacks with airlines. However, at the Singapore air show in 2014, it placed an order for 20 ATR 72-600s with 20 options, for delivery by 2018. It remains DAE's only speculative deal since the heady early days, and its first for regional aircraft.

The ATRs are an interesting choice for a lessor that until now has stuck to heavier metal. Tarapore says DAE will soon announce customers for this latest batch of ATRs, although it has invested elsewhere in the French-built product, recently completing leasing deals with Brazil's Azul Airlines, Airlines PNG of Papua New Guinea, and Myanmar National Airlines for a total of 17 ATR 72-600s, to be delivered this year and next.

» DAE has just delivered the final aircraft of its other flagship contract, an exclusive sale and leaseback with Emirates for 13 777 freighters, won in 2008.

Tarapore insists the lessor got no favours from its sibling, with which it shares a chairman in Sheikh Ahmed Bin Saeed Al Maktoum. "We committed to provide their entire freighter fleet requirement and we won it in a competitive process," he says. "We don't get any special access. We are a commercial operation, as they are, and we have a common ownership with Emirates, but that's where it stops."

### COMPETITIVE EDGE

Tarapore is relaxed about competing with giant rivals, although he concedes "you have an in-built advantage if you are owned by a bank, with access to zero-interest cost of funds, or an entity that can use its parent's high credit ratings to borrow inexpensively, or lessors with access to low-cost capital and with low ROE [return on equity] requirements". Instead, he says, DAE concentrates on "clients who value the capital we bring to the table and also the full-service package we provide – which can be useful when things go wrong and as they grow their business".

DAE, he maintains, attempts to "understand the story of your airline and what you are trying to do". Once comfortable with the carrier's business model, he says, "we feel we can take a larger credit risk, as we can predict how that story is likely to play out". The firm, he says, "cannot chase business that views what we provide as a commodity".

DAE last year had revenues of \$2.11 billion, although most of that was accounted for by Standard Aero. Tarapore says the MRO was sold not because it was a poor performer but because it was trading strongly, and this gave DAE the opportunity to refocus the business while making a good return on its initial investment.

Standard Aero had been bought to "bring the nexus of MRO activities to Dubai", says Tarapore. However, because most of the company's activities were in the business jet, regional jet and military engine market – rather than the widebody segment that dominates in the Gulf – the hoped-for synergies never materialised, and the US company "became more of a financial investment than a strategic investment", he says.

Tarapore says DAE's biggest markets are now Africa and Latin America, with many start-up airlines that need help to get established. Iran too has huge potential, he believes. The nation has a fleet of ageing and obsolete aircraft ripe for replacement as Western economic sanctions are eased. "This isn't lost on any of the players. Everyone has a plan consistent with what is allowed," Tarapore says. However, he adds with a smile: "We just happen to be the entity that is closest." ■



Work to add simulator bays will begin by the end of the year

### SIMULATORS

## Stepping up training

ECFT, the joint venture between CAE and Emirates, is expanding in Dubai as regional demand for airline pilots continues to rise

MURDO MORRISON DUBAI

Just two years after opening its second training centre in Dubai, Emirates CAE Flight Training is doubling the size of the operation with five more simulator bays. The expansion – work on which will begin by the end of the year – will allow ECFT to cater for the burgeoning demand for new first officers and ongoing pilot training from anchor tenant Flydubai, as well as other airlines from the Middle East and India, including IndiGo, Jet Airways and Oman Air.

The joint venture between the airline and the Canadian simulator manufacturer and training provider was established in 2002 mainly to provide simulator hours to the region's business aviation and helicopter operators – a 14-bay site on one of Emirates' training campuses, at Garhoud, near Dubai International, opened four years later with the unit operating separately from the airline's own pilot training facilities.

But the establishment of Flydubai in 2009

and the low-cost carrier's rapid expansion to a current fleet of 50 Boeing 737-800s prompted ECFT to invest in a second operation at the city's Silicon Oasis equipped with three 737 and two Airbus A320 simulators. "We saw that there would be a need for local pilots," says ECFT managing director Walter Visser. "It has been a huge success. In one year, we filled all the bays."

CAE has still to confirm what additional simulators it will offer at Silicon Oasis, but there will be at least one 737 and a 777. "The rest we are working on," says Visser. Flydubai's demands are likely to be a big influence. At the last Dubai air show, the carrier ordered up to 100 737 Max aircraft with deliveries from 2017, and its fleet should reach treble figures by 2020. "We are keeping pace



Visser: foresaw need for more local pilots



with their growth,” says Visser.

Twelve of the bays at Garhoud are devoted to general aviation (Emirates uses the other two). Types include a Bombardier Challenger 604/605 and Global 5000/6000, a Gulfstream GIV, GV/550 and Dassault Falcon 900/2000 and 7X, as well as a Hawker 800 and Bell 412. A Gulfstream G650 will arrive next year. CAE also won the deal to provide training for Das-

**“We anticipate further prospects with them as they continue to make orders”**

**NICK LIONTIDES**

President, civil aviation training solutions, CAE group

sault’s new 5X. “We have yet to announce locations for the 5X,” says CAE group president, civil aviation training solutions Nick Liontides. “But I expect Dubai to be one of them.”

Liontides says both segments of ECFT’s business are performing strongly, “thanks to the growth we are seeing in the region”. On the business aviation side, the simulators attract custom from Europe and Africa as well as the

region itself, he says. Although the big three Gulf carriers – Emirates, Etihad and Qatar Airways – operate their own simulator centres, they are customers for CAE’s equipment. “We anticipate further prospects with them as they continue to make orders,” he adds.

On the ab initio side, CAE has worked with Emirates on its cadet programme since 2013 and this year 55 trainee first officers – the vast majority Emirati citizens and double the 2014 intake – will take their first steps into their career with CAE Oxford Aviation Academy, completing the flying portion of their course at CAE’s facility in Spain. Emirates is building its own dedicated flight training centre at the new Dubai World Central airport.

Meanwhile, CAE’s main competitor in simulator training provision, FlightSafety International, is developing an eight-bay facility in partnership with helicopter operator Abu Dhabi Aviation. The deal, signed at last year’s MEBA business aviation show in Dubai, was for phase one of the centre to open in September this year, followed by a phase two, which would see the centre more than double in size to 17 bays. However, the status of the project is currently unclear. ■

#### DEFENCE PROCUREMENT

## Countering the threat

The rise in terrorism and civil instability in the region has prompted Gulf nations to invest in modernising their fighter fleets

**BETH STEVENSON LONDON**

**T**errorism is not a new threat for Middle Eastern air forces to contend with, but the rapid rise of Islamic State militants in the region has laid unexpected pressure on the nations and their allies, following the troop draw-downs in Iraq and Afghanistan.

The presence of the militants primarily in Iraq and Syria has led to Western participation in air strikes under the USA’s Operation Inherent Resolve, which was closely followed by the involvement of regional air forces, including those of Bahrain, Jordan, Qatar, Saudi Arabia and the United Arab Emirates. »



# Su-30SM

## The ultimate teamwork solution for diverse combat applications

[www.irkut.com](http://www.irkut.com)





The UAE air force operates 79 Block 60 Lockheed Martin F-16s, which are due to be upgraded to a Block 61 standard

Lockheed Martin

» With an ever-growing threat on the doorstep, and some ageing fighter fleets, Middle Eastern air forces have made and continue to make a concerted effort to acquire modern offensive capabilities to counter the militants.

Kuwait currently has a 34-strong fleet of Boeing F/A-18C/Ds, with an average age of some 22 years, according to Flightglobal's Fleets Analyzer database, and committed to replacing these with Eurofighter Typhoons in a deal announced with the Italian government in September. It plans to acquire 28 of the type, in a deal believed to be worth \$9 billion, having rejected bids from Boeing with its F/A-18E/F Super Hornet and Dassault with the Rafale.

#### REGIONAL SUCCESS

The Kuwaiti selection came three years after Eurofighter's previous international sale, and if a production contract is finalised, it will be the third regional success for the European consortium, which has also previously sold the Typhoon to Saudi Arabia and Oman.

"This new international success follows an order from the Sultanate of Oman for 12 aircraft in December 2012 and it is further evidence of growing interest in the Eurofighter Typhoon across the globe, and in the Gulf Region in particular," Eurofighter said after the Kuwaiti selection was announced.

Muscat's selection of the Typhoon will see the dozen aircraft added to the Royal Air

Force of Oman's relatively young fleet of 23 Lockheed Martin F-16C/Ds, which range from between one and 10 years in age. Twelve more Typhoons are also on option for the nation, which would put it just behind Kuwait in terms of numbers of the type in the region.

An active electronically-scanned array radar development for the Typhoon, plus the planned integration of additional weapons in the form of MBDA's Storm Shadow, Brimstone and Meteor missiles – the latter of which is nearing completion, has recently added to the type's appeal.

However, while the Typhoon had two years ago looked like it was in with a chance of equipping all six Gulf Cooperation Council nations, it has since lost out to others in the region – a development that could in part be attributable to the price point of the aircraft.

One such example is Qatar, which announced in April 2015 that it had opted to acquire the Rafale.

Qatar, which currently operates 13 Dassault Mirage 2000-5s and six Alpha Jets, elected to acquire 24 Rafales. Its decision closely followed a first export contract from Egypt – for 24 aircraft – and an Indian selection of 36. These successes for Dassault placed it in the export market after years of only managing to secure its domestic customer for the aircraft, and it still has a chance of making sales to Bahrain and the UAE.

Bahrain operates 22 F-16C/Ds and 12 North-

rop F-5s, and has touted its plans to upgrade the former for some time now. The F-16 fleet ranges from between 13 and 26 years old, and is becoming increasingly expensive to maintain. As an interim measure, the US government in August authorised a requested \$150 million deal to support the fighters, through the provision of new support and communications equipment, as well as ammunition.

"The follow-on support is required to maintain the operational readiness of the Royal Bahrain Air Force's F-16 fleet," the US Defense Security Cooperation Agency (DSCA) said, adding that "periodic maintenance is becoming increasingly expensive. The age of the fleet, combined with an increased operational tempo due to recent involvement in Operation Inherent Resolve, has led to increased focus on maintenance and sustainment."

Bahrain could follow in the footsteps of neighbouring Saudi Arabia in its acquisition, with Riyadh having ordered 72 Typhoons.

Saudi Arabia has the largest fleet of combat aircraft among the GCC partners, also operating the Panavia Tornado and Boeing F-15. Riyadh has 81 Tornados in its inventory, and has so far received 51 of its Typhoons. Its air force is also in the process of receiving a new variant of the F-15 – the F-15 "Saudi Advanced" (SA) – from Boeing.

The Royal Saudi Air Force has operated the F-15 for some 34 years, and has a 78-strong fleet of C/Ds and 69 F-15S in service, the latter



of which have been in operation since the 1990s. It has 84 F-15SAs on order, with testing of the new variant having begun in 2013. Boeing rolled out the first of the type in April the same year. The F-15SA is touted as having a lower lifecycle cost than previous iterations, plus two additional wing stations for increased payload and a fly-by-wire flight control system.

### Bahrain could follow in the footsteps of neighbouring Saudi Arabia... with Riyadh having ordered 72 Typhoons

The UAE, meanwhile, expended a significant effort on comparing the Rafale against the Typhoon for its new strike requirement, but in the end opted for neither, and instead selected to make an attrition buy of upgraded F-16s. It has requested 30 new F-16s to be delivered to a Block 61 standard, although it is not clear if a contract for the aircraft has yet been signed. It currently has a 79-strong fleet of Block 60-standard F-16E/Fs, with Fleets Analyzer showing 77 as being in service.

### UAE UPGRADE

While the Block 61 acquisition will be completed as a direct commercial sale, instead of using the US government's Foreign Military Sales route, an FMS deal for associated equipment and training was approved by the DSCA in January 2014, worth an estimated \$270 million. Despite being between four and 12 years old, the UAE's current F-16s are also due to undergo an upgrade that will take them to a similar level to the new Block 61s.

The UAE has previously expressed an interest in Lockheed's F-35 Joint Strike Fighter, but its lack of availability – it will not be ap-

proved for delivery to the Gulf region for some years to come – drove the move towards an interim solution.

Both the Typhoon and Rafale had been pitched to the UAE, but in December 2013 it was announced that negotiations between the state and Eurofighter had come to an end. This was two years after the potential customer had asked it to submit a bid for the requirement, and only a month after speculation had mounted that a selection could be made at the 2013 Dubai air show.

Considering that no firm contract has seemingly been made for the Block 61 F-16s, the two previously competing types could still be in with a chance in the UAE, and the recent successes for both types – Dassault in Qatar and Eurofighter in Kuwait – within GCC countries could put them back in the view of the outstanding customer.

Outside the GCC, other regional nations that are undergoing transitions in their F-16 fleets include Iraq and Egypt.

Iraq is currently in turmoil as IS militants have seized large swathes of its territory, prompting the government to request aid from western and local allies to help counter their advances. As for its own air force, Baghdad ordered 36 F-16IQs under a \$6.5 billion FMS deal with the US government in April 2013,



Kuwait plans to buy the Typhoon



Qatar has opted to acquire a fleet of 24 Rafales from Dassault

### FIGHTER AIRCRAFT IN THE MIDDLE EAST

| Country/type                | In Service | On order |
|-----------------------------|------------|----------|
| <b>Bahrain</b>              | 33         |          |
| F-16                        | 21         |          |
| F-5                         | 12         |          |
| <b>Iraq</b>                 | 17         | 27       |
| Su-25                       | 9          |          |
| F-16                        | 8          | 27       |
| <b>Kuwait</b>               | 34         |          |
| F-18                        | 34         |          |
| <b>Oman</b>                 | 33         | 12       |
| F-16                        | 23         |          |
| Hawk                        | 10         |          |
| Eurofighter                 |            | 12       |
| <b>Qatar</b>                | 19         | 24       |
| Mirage 2000                 | 13         |          |
| Alpha Jet                   | 6          |          |
| Rafale                      |            | 24       |
| <b>Saudi Arabia</b>         | 281        | 105      |
| F-15                        | 149        | 84       |
| Tornado                     | 81         |          |
| Eurofighter                 | 51         | 21       |
| <b>United Arab Emirates</b> | 130        |          |
| F-16                        | 75         |          |
| Mirage 2000                 | 55         |          |

SOURCE: Flightglobal's Fleets Analyzer database

the first four of which were delivered in July.

The Iraqi air force lost one of its F-16s during a night-time training crash in Douglas, Arizona in June, killing its pilot.

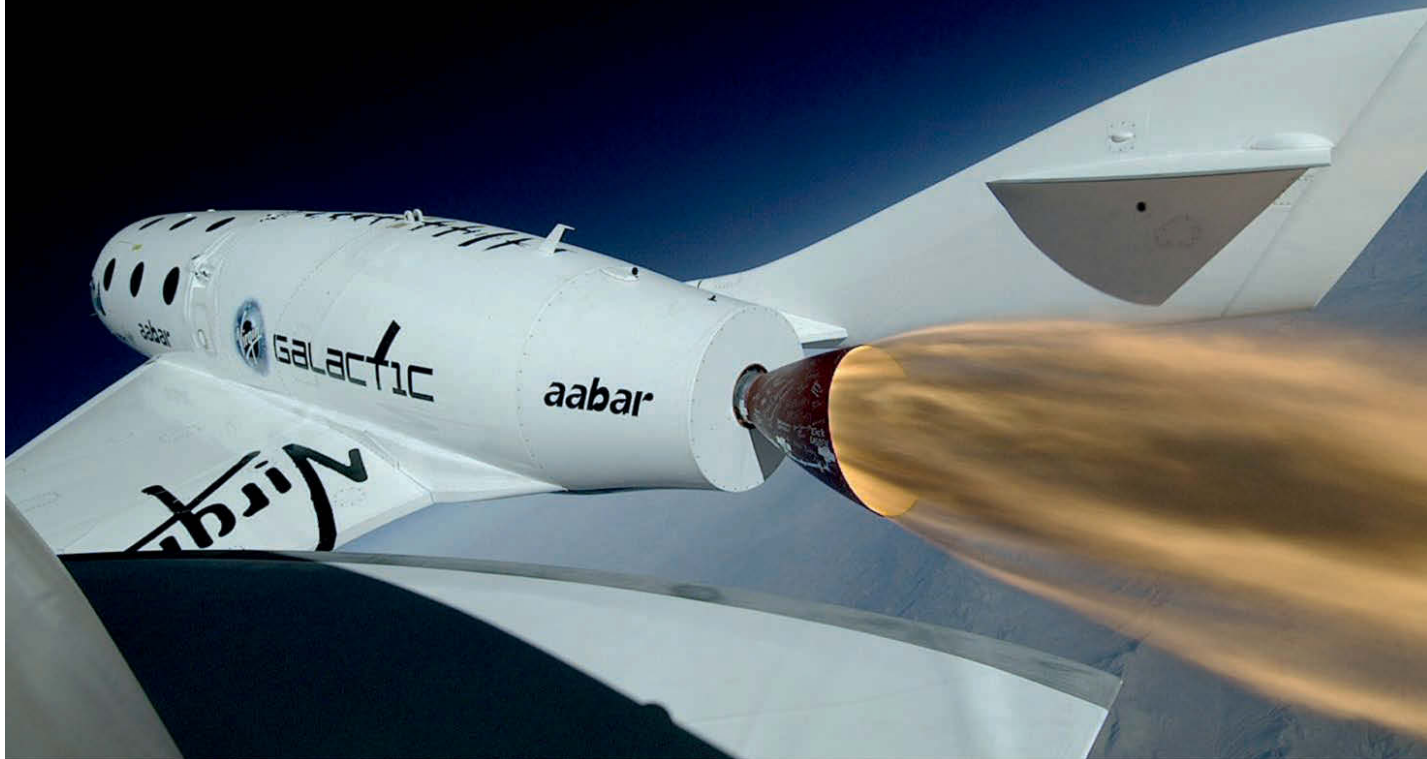
Iraq's first F-16 rolled off the assembly line in Fort Worth, Texas in June 2014, but the support infrastructure that was required at the type's base in Balad was not ready or secure enough for its planned delivery. The rise of IS also led to the delivery of the first four aircraft being delayed from September 2014 until July 2015. During that time, its early aircraft were diverted to the US Air Force's international F-16 schoolhouse at Tucson International airport in Arizona, to support pilot training.

Deliveries of Egypt's Block 52-model F-16Cs were also resumed in July, following the lifting of an embargo that had been imposed as a result of a military coup in the nation in 2013.

Eight of Cairo's new Block 52 jets have been delivered since then, in addition to eight F-16C/Ds that were transferred before the embargo was enforced. A contract for a combined 20 aircraft had been signed in 2010, with this covering 16 F-16Cs and four D-model trainers. Another four F-16Cs from the order are still to be delivered. Egypt is a seasoned F-16 operator, and has some 200 older examples in its fleet.

Three of Egypt's recently-ordered Rafales have already been delivered to the nation's air force, which also operates earlier Mirage 2000s and Mirage Vs, plus Mikoyan MiG-21s and Chengdu J-7s. ■

Abu Dhabi's Aabar is a key investor  
in Virgin Galactic's SpaceShipTwo



ZUMA/Rex Shutterstock

**SPACEFLIGHT**

# Reach for the stars

The new UAE Space Agency is to undertake a mission to Mars marking the 50th anniversary of the federation's founding

**DAN THISDELL** LONDON

**F**or a growing number of developing countries looking to bolster their scientific and educational base and deliver an increasingly powerful array of services on the ground, there is no substitute for looking to space. Not surprisingly, the UAE is one among this number – but the Gulf country set its sights unusually high when it established its own space agency in July 2014.

Indeed, the UAE Space Agency shares goals in common with many of its approximately 70 counterparts worldwide: to develop the country's space sector, policy and regulation; direct national programmes that will benefit the economy; promote scientific research in the UAE; and help prepare Emiratis for careers in space science.

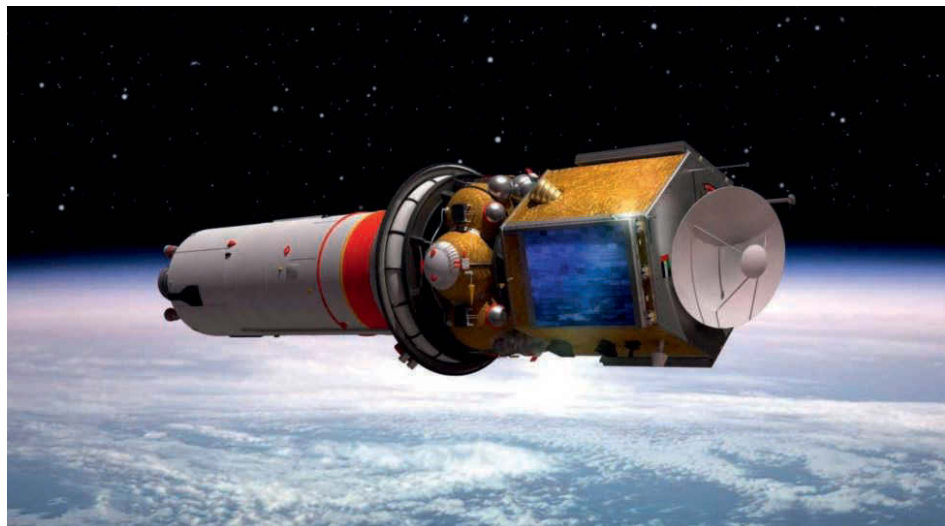
But the agency's vision statement points to

a grander plan: "To proudly craft the future of the United Arab Emirates as a leader in space exploration and inspire the next generations for the benefit of the nation and mankind." In exploration, the UAE intends to make an early mark – by launching a mission to Mars in July 2020 to arrive in early 2021, to mark the 50th anniversary of the UAE's founding.

Details remain to be established, but the broad scheme of this first attempt at interplanetary exploration by an Arab country is well

sketched out. The plan is to put a spacecraft in a higher orbit around Mars than has been occupied by missions to date – as high as 20,000-30,000km – in order to study, comprehensively, the Martian climate and day-night cycle and measure the loss to space of molecules from the atmosphere. As such, Hope promises to complement existing and recent Mars observation missions from NASA, the European Space Agency and India.

The design of the spacecraft and its visual light, infrared and ultraviolet sensors is ex-



Mohammed bin Rashid Space Centre

**The agency is aiming for a 30% contribution to the Hope spacecraft from local engineers**



pected to be carried out under the guidance of partner universities in the USA, but the agency promises that “nearly 30%” of the contribution will come from UAE engineers. With a launch mass of about 1,500kg (3,300lb), Hope should be deliverable by any of the commonly available launchers.

On the ground, two mission control centres will monitor Hope; one in the UAE and one in a partner facility. A development plan for UAE scientists is also being worked out, to ensure that the country’s knowledge base is fit for future exploration missions.

#### STAR GAZING

Meanwhile, a UAE national observatory is under construction in Dubai and expected to open in the second half of 2016. The agency promises it will be the “key astronomy facility in the Arabian peninsula”.

### The UAE... already operates some seven satellites, for commercial and military use

And, the UAE is preparing to launch its first cubesat mission; Nayif-1, built by Emirati engineering students at the American University of Sharjah, will study the design, testing and operation of communications satellite technologies. Launch has been scheduled for late 2015 by Falcon 9 rocket, but timing must be assumed to be subject to the return to flight of that vehicle following SpaceX’s total loss of a mission in June 2015.

In any case, the UAE’s space expertise pre-dates the establishment of its space agency. The country already operates some seven satellites, for commercial and military use.

The Emirates Institution for Advanced Science and Technology has been designing satellites for launch since 1997. And, Emirati investment company Mubadala owns the Al Yah Satellite Communications company – “Yahsat”. Founded in 2007, Yahsat’s two satellites and ground infrastructure currently provide communication services to some 600 million people in 140 countries in the Middle East, Africa, Europe, and central and south-west Asia. A third satellite, to cover South America and west Africa, will launch in 2016.

Another Abu Dhabi company, Aabar Investments, has a particularly high profile – its logo is prominent on the side of Virgin Galactic’s vehicles. Aabar’s 37.8% equity stake in Galactic Ventures, the Virgin Group company that is building the SpaceShipTwo vehicle and will operate Virgin’s suborbital tourism flights, is also a key financial plank in the group’s bid to develop its LauncherOne air launch system for small satellites. ■

#### BUSINESS AVIATION

## Building a new future

Al Bateen and Dubai World Central have become the focal point for development of business aviation services in the UAE

MURDO MORRISON ABU DHABI

**B**usiness aviation in the Gulf is on a new trajectory. At the turn of the decade, the emphasis was very much on the charter market, with a flurry of ambitious start-ups and management companies setting up shop alongside early adopters such as Boeing Business Jet operator Royal Jet in Abu Dhabi, and Swiss-based maintenance and management companies ExecuJet and Jet Aviation in Dubai. Five years on, the original brands are still there, but many of the newer outfits have ceased trading or consolidated. Instead, the spotlight is very much on infrastructure, at two airports in particular.

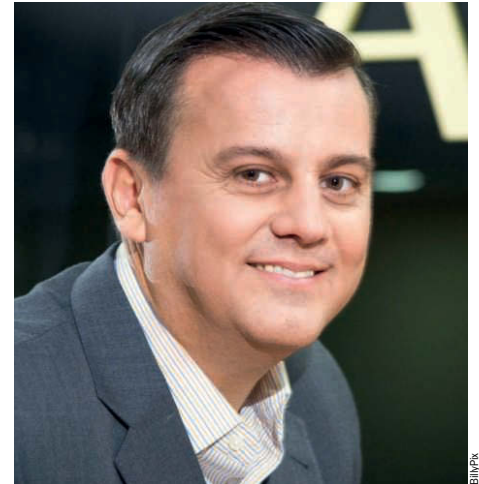
In Abu Dhabi, the downtown dedicated business aviation airport, Al Bateen, has been fully transitioned from its previous guise as a military air base, and is home to two of the emirate’s big three business aviation operators: Al Jaber Aviation (AJA) and Falcon Aviation. Just over an hour’s drive away, the new Dubai World Central is rapidly expanding its business aviation footprint as it begins to displace Dubai International as the main private aviation gateway into that emirate.

#### TRAFFIC PRESSURE

The rapid expansion of commercial flights at Dubai International has made it trickier for business aviation to operate there, and landlord Dubai Airports is keen to relocate as much traffic as possible to the still under development and largely empty desert airport. While the two big fixed base operators at Dubai International, ExecuJet and Jet Aviation, have their maintenance shops there, they have both opened small FBOs at DWC in the past two years.

They are joined at the new airport by DC Aviation, which opened a high-end FBO there in late 2013 with local partner Al Futtaim. The facility, with maintenance hangar, VIP lounges and crew areas, is currently by far the largest business aviation facility at DWC, but it will soon be dwarfed by a bigger development. Falcon Aviation is due to open shortly what it describes as the Middle East’s first completion facility for business jets.

Falcon held a ground-breaking ceremony at last December’s Middle East Business Avi-



Pierotti: 10-year plan to broaden offering

ation exhibition, held at DWC. It says the \$80 million, 13,700m<sup>2</sup> (147,000ft<sup>2</sup>) development, with a hangar large enough for an Airbus A380, is set for completion by the end of 2015. Falcon, established in 2006, operates a fleet of Bell 412 helicopters serving the offshore oil and gas industry and is already an authorised maintenance facility for Embraer business jets and Airbus Helicopters at Al Bateen.

#### EVOLVING SERVICE

Cabin completion takes the Gulf to the next level in terms of business aviation services. Aside from the original equipment manufacturers themselves, only a handful of independent companies around the world can install interiors on green business aircraft. For corporate jets derived from Airbus, Boeing and Embraer narrowbodies, the market is even smaller, and for widebody projects, just three or four companies worldwide have the expertise.

### “Rising competition... and ever-tightening budgets have resulted in a shift in the way aircraft owners and operators are doing business”

SHEIKH ZAYED AL NAHAYAN

Chairman and chief executive, Falcon Aviation

Falcon has not confirmed what range of capabilities it will offer at the new centre or what its first project will be – although it did last year sign a letter of intent for a Bombardier CS300 aircraft. Its chief executive Sheikh Zayed Al Nahayan said at the opening ceremony that the facility would fill an unserved niche in the region. “Rising competition in the industry and ever-tightening budgets have resulted in a shift in the way aircraft owners and



**Qatar Executive and rival Royal Jet are both in the process of expanding their fleets**

» operators are doing business,” he said.

Meanwhile, Falcon’s Al Bateen neighbour AJA plans to broaden its offering from the competitive charter segment with a move into maintenance, repair and overhaul. AJA is negotiating to form a joint venture with a “well-known European MRO provider” to open a hangar at the airport, says chief operating officer Mark Pierotti. The 300m<sup>2</sup> facility will focus on light maintenance of Airbus and Boeing narrowbodies, as well as Embraer and Hawker jets. It is due to open in 2018.

After that, AJA has a “10-year plan to take us up to major checks, as well as overhauls, although not full-scale completions”, says Pierotti. The business will not just be restricted to business jets. Pierotti says Etihad’s recent purchase from Mubadala of the former Abu Dhabi Aircraft Technologies to become its in-house engineering department has created a “gap in the market”, adding: “At the moment a lot of narrowbodies go out of the country for maintenance.”

#### SCALING BACK

AJA, founded in 2007, has ramped back on original plans to acquire a large fleet of Airbus and Embraer corporate jets, offering an Airbus A318 Elite and Embraer Lineage 1000, as well as a Hawker 800XP under its Sky Limo sub-brand. It is also moving into aircraft management and operates an aviation consultancy and training joint venture, Avisia Gulf. “VIP charter is no longer enough for us,” admits Pierotti. “The charter market is extremely competitive. We need multiple revenue streams.”

Half an hour’s drive from Dubai International, the small Sharjah airport is the Gulf base for management and charter provider Gama Aviation. The UK-based company is expanding its new FBO there with additional parking space. Gama markets Sharjah as being a low-cost and more convenient alternative for operators and passengers heading out of or

into downtown Dubai – the airport is half the driving distance to Dubai’s city centre than the new DWC, it maintains.

While elsewhere the focus has been on infrastructure, two Gulf business aviation operators, Royal Jet and Qatar Executive, are very much in the fleet expansion game. Royal Jet, the region’s original charter provider, has in the past 12 months taken delivery of two Bombardier Global 5000 aircraft, as well as two Learjet 60XRs. Royal Jet has also ordered two more BBJs and says it wants to take its fleet to 20 aircraft by 2020. Before the new arrivals, it had a fleet of 11.

Royal Jet is the largest operator of BBJs in the world with a fleet of six and has been serving the ultra-wealthy of the Gulf and the wider world since 2003. It also operates two Gulfstream G300s and two other Learjet 60s – mostly as medical evacuation aircraft. The company – which is not making any announcements until the Dubai air show – has said it is considering Airbus Corporate Jets, the CS300 and Gulfstreams for its future fleet requirements.

At Dubai, Qatar Executive will display its latest addition, a Gulfstream G650ER, as part of the exhibit of its parent Qatar Airways. In one of the sector’s most significant deals for some years, at EBACE in May, the operator firm an earlier memorandum of understanding for 20 Gulfstream business jets, and added 10 more to the order. The 30 firm orders covered a combination of Gulfstream’s new G500 and G600 jets, joining the ultra-long-range G650ER.

Qatar Airways launched its executive division in 2009 as an extension of its airline brand, aimed at a segment of the market prepared to pay more than its first-class scheduled product for the flexibility, privacy and added comfort of a business jet. The new orders will almost certainly make Qatar Executive – which since the demise of Doha-based Rizon Jet has a monopoly on services out of the Qatari capital’s new Hamad International airport – the region’s biggest business aviation operator. ■

**ATM MURDO MORRISON LONDON**

### A REGION IN NEED OF AIRSPACE HARMONY

THE GULF’S airports may be growing fast but, as traffic to and from the region rises, its skies are becoming increasingly congested and difficult to manage. Seeking a solution to this problem has long been an issue for governments wary of letting go of control of their national airspace.

A report from Oxford Economics – commissioned by UK air traffic management body NATS – concludes that \$16.3 billion in economic benefits could be achieved in the Middle East as a result of improvements in air traffic control systems.

Despite the huge growth in aviation in the region, available airspace has not kept pace, argues the report. With half the airspace in the Middle East reserved for military flights, the number of

handovers that take place between authorities in different divisions of airspace lead to additional delays, says Oxford Economics.

Using data from Eurocontrol and NATS, Oxford Economics calculates that the average flight in the region is delayed by 36min, with 82% of these delays attributable to air traffic control capacity issues.

#### DELAYS LOOM

“By 2025, without further investment in air traffic control systems, a doubling of delay minutes to 59min would cost the region \$16.3 billion,” says the report.

Last year, Qatar Airways chief executive Akbar Al Baker described the failure of Gulf states to harmonise their airspace as “an accident waiting to happen”.

Speaking at the Arab Air Carriers Organisation gathering in Dubai, he said the existence of six flight information regions, when traditionally one, Bahrain, controlled most of the peninsula, was “causing congestion and bottlenecks and costing us millions in unnecessary fuel spend”.

At the same meeting, a proposal for a pan-Arab air traffic control system was floated, but the idea has not gained much traction.

Speaking at the AACO event, secretary general Abdul Wahab Tefhah described ATM as the “most important” weakness facing the region. He said that adopting more flexible use of airspace – notably capacity which could be secured from the military – and renovating air navigation systems would help relieve bottlenecks. ■



From yuckspeak to tales of yore, send your offcuts to [murdo.morrison@flightglobal.com](mailto:murdo.morrison@flightglobal.com)

## Howard's return to the heyday

Before business jets, there was the Howard 500. One of two remaining examples of the corporate type (*pictured*) – built in the 1960s by the Howard Aero company of San Antonio – is set to grace the static display at this year's NBAA exhibition.

The last radial-engine civil transport, the Pratt & Whitney R-2800-powered Howard 500 entered service in 1963 as “the first transcontinental business aircraft”. Only 17 were made; by the time it hit the market, it had been superseded by turboprops and early business jets.

Founder Durrell Unger (‘Dee’) Howard had licence-built aircraft for Lockheed, and the Howard 500 was ‘inspired’ by the Ventura, in particular. The Howard 500 was the last aircraft built by Howard, although his company evolved into an innovative engineering concern, working with several of the business-aircraft manufacturers.

## Straight answer

This newspaper headline caused some bemusement among our hacks: “Ultra-Long Range Airbus A350-900 Can Fly 19 Hours Straight For SIA's Singapore-US flights”.

“That's all very well,” remarked one. “But what if they wanted to go round a corner?”



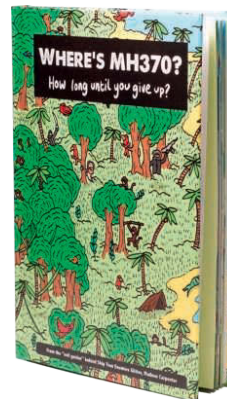
“Sit back and relax, ladies and gentlemen. We'll have you back in New York in time for cocktail hour.”

## What a Wally

Reluctant as we are to give any publicity to this piece of crassly insensitive marketing, we can't let it go unmentioned. Pictured right, believe it or not, is a genuine attempt to promote a work examining the fate of the Malaysia Airlines 777.

There are doubtless good intentions behind it. According to the publicity, *Where's MH370?* is “a book that both informs and entertains readers, helps out the authorities by encouraging a crowdsourced search in locations that many would not suspect the plane to be, and also opens a discussion about [its] possible resting place”.

But to make light of a tragedy in which 239 people lost their



lives with a spoof *Where's Wally/Waldo?*-type cover is simply in poor taste.

We won't be reviewing.

## One of the few

The band of brothers who defended their homeland in the Battle of Britain is diminishing in numbers, but one survivor who is still going strong is Wg Cdr Tom ‘Ginger’ Neil.

Neil, 95, was guest of honour at a recent banquet staged in Washington DC by the RAF Museum American Foundation to celebrate the 75th anniversary of the battle.

Neil, who flew 141 combat missions in Hurricanes as well as Spitfires, gave an entertaining speech about his exploits. Our own Robert Hancock presented him with a framed *Flight* Spitfire cutaway, as drawn in 1938 by Max Millar.



Time flies: Flightglobal's Hancock presents Neil with our Spitfire cutaway

## Reuters in Rome

“This morning Venice was the object of a fresh attack, three

**100 YEARS AGO**

Austrian aeroplanes dropping several bombs at 8.40

a.m. Three people were slightly injured. The material damage done was very slight. The *Giornale d'Italia* remarks: ‘The pious Emperor and devout Archdukes will no doubt be glad to know their fury has descended on a church.’”

## Petrol Down Under

The first petrol produced from shale on a commercial scale in

**75 YEARS AGO**

Australia was distilled at Glen Davis, New South Wales, recently.

Petrol rationing began on October 1 in Australia. There was a big rush to buy reserves during the preceding week-end, New South Wales motorists buying 2½ million gallons at a cost of nearly £300,000.

## Up in the air

France is to launch a craft into orbit. In a launch from

**50 YEARS AGO**

Hammaguir in the Sahara on November 26, a 931b test capsule

designated A-1 was placed in orbit by a three-stage Diamant vehicle. The capsule carries a radio beacon but no scientific instruments; its initial orbit was at 330-1,125 miles.

## Yuckspeak of yore

“...a lot more acceptable environmentally from a reduced

**25 YEARS AGO**

noise point of view...” = quieter. (From *Flight Safety Bulletin*, via nephew Tim Nathan)



**100-YEAR ARCHIVE**

Every issue of *Flight* from 1909 onwards

can be viewed online at [flightglobal.com/archive](http://flightglobal.com/archive)

## FLIGHT INTERNATIONAL

We welcome your letters on any aspect of the aerospace industry.

Please write to: The Editor, Flight International, Quadrant House, The Quadrant, Sutton, Surrey, SM2 5AS, UK. Or email [flight.international@flightglobal.com](mailto:flight.international@flightglobal.com)

The opinions on this page do not necessarily represent those of the editor. Letters without a full postal address supplied may not be published. Letters may also be published on [flightglobal.com](http://flightglobal.com) and must be no longer than 250 words.

### Virgin on the inexcusable

I am sure that many of your readers were as astonished as me to read that Boeing designed a part that could be fitted the wrong way around (*Flight International*, 27 October-2 November).

After the disaster in the 1950s, in which a fuel valve was fitted incorrectly, I thought such an error was supposed never to happen again.

It made me think whether there are other such faulty designs in modern jets?

**J McDermott**  
Hereford, UK



It's training men, too

### Easy treatment?

In the 27 October-2 November issue of *Flight International* there was a news item on EasyJet's



Widmark Media/Rea Shutterstock

Scientific proof is lacking, and not through the want of trying

#### TOXICITY

### No evidence for cabin air claims

Dr Susan Michaelis makes an interesting case about the so-called problems with aircraft cabin air (*Flight International*, 27 October-2 November).

She is not quite fully informed about the situation, in that some of us – who are independent of any authority or commercial interest – have been trying to prove the allegations made about the toxicity of cabin air for many years.

It is all very well to go around stirring up public and other opinions about these allegations. If you make such a claim, you have to produce scientific evidence that will stand up to scrutiny in the courts. We have frequently monitored pilots who fly in contaminated air environments. We have fully investigated many pilots who allege that they have been affected by this heavily filtered and purified air. Not once have we been able to scientifically prove that there has been a deleterious effect, or permanent damage to anyone exposed to any of the supposed contaminants.

We have offered to investigate anyone who considers that they have been affected. So far there have been no volunteers.

Some of the testing is invasive. I am part of a small worldwide group looking at the very latest technology available to us and equipment that is coming, but there are no advances yet or forecast, which will help us to get the proof we need for this case.

We were always taught in toxicology, if you can smell it, it is dangerous. Proving it is dangerous is still just out of our scientific reach.

**Dr Ian Perry**

Consultant in Occupational and Aviation Medicine; via email

new training centre at Gatwick.

In an effort to boost female pilots, the airline is going to offer 10 positions each year to female candidates and will “underwrite their approximately £100,000 course fee”.

Is this legal? Is it not sex discrimination against the male students – who I believe, from looking at CTC Aviation's web pages specifically for EasyJet

student pilots – have to pay for their training?

**Graham Dinsdale**

Via email

### Knowing your Boeing

The un-Royal Air Force name of Rivet Joint continues to stir readers' passions (*Flight International*, 27 October-2 November). Few

“popular names” can have proved so unpopular.

Before the first aircraft was delivered, I wrote to a senior RAF officer closely connected with the programme suggesting an alternative name with historical precedent, doubly appropriate to both the operating base at Waddington in Lincolnshire and the unit, 51 Squadron.

A courteous reply informed me that Their Airships had decided to adopt the US Air Force code name to make the politico-military statement that Rivet Joint is a unified, interoperable force which just happens to be supplied by two air arms.

My suggestion? The Boeing Washington.

**Paul Jackson**

Pulham Market, Norfolk, UK



Design Pic Inc/Rea Shutterstock

The truck stops here

### Arctic role

When the Lockheed Martin F-35 was first mooted, I believed it was intended to combat aggressors rather more sophisticated than a few Arctic (trucks?) in the Canadian far north – or elsewhere for that matter.

But since this is mentioned twice in your Comment article (*Flight International*, 27 October-2 November) I assume that a few articles must be in their sights.

**Julian Bennett**

Sible Hedingham, Halstead, UK

*Editor's reply: Sorry for the error; it's the cold shoulder for our proof-reading culprits*



Theory of evolution: how four top-selling airliners changed for the better  
[www.flightglobal.com/evolution](http://www.flightglobal.com/evolution)



## EDITORIAL, ADVERTISING, PRODUCTION & READER CONTACTS

### EDITORIAL +44 20 8652 3842

**Quadrant House, The Quadrant,  
Sutton, Surrey, SM2 5AS, UK**  
flight.international@flightglobal.com

**Editor** Craig Hoyle  
+44 20 8652 3834 craig.hoyle@flightglobal.com  
**Deputy Editor** Dominic Perry  
+44 20 8652 3206 dominic.perry@flightglobal.com  
**Head of Strategic Content** Murdo Morrison FRAeS  
+44 20 8652 4395 murdo.morrison@flightglobal.com  
**Features Editor** Dan Thisdell  
+44 20 8652 4491 dan.thisdell@flightglobal.com  
**Business & General Aviation Editor** Kate Sarsfield  
+44 20 8652 3885 kate.sarsfield@flightglobal.com  
**Aerospace and Defence Reporter** Beth Stevenson  
+44 20 8652 4382 beth.stevenson@flightglobal.com  
**Consulting Editor** David Learmount  
+44 7785 901787 david.learmount@tworld.com  
**Magazine Enquiries** Dawn Hartwell  
+44 20 8652 3315 dawn.hartwell@flightglobal.com

### AIR TRANSPORT TEAM

**Editor Flightglobal Premium News** Graham Dunn  
+44 20 8652 4995 graham.dunn@flightglobal.com  
**Managing Editor** Niall O'Keeffe  
+44 20 8652 4007 niall.okeeffe@flightglobal.com  
**Air Transport Editor** David Kaminski-Morrow  
+44 20 8652 3909 david.kaminski-morrow@flightglobal.com  
**Air Transport/MRO Reporter** Michael Gubisch  
+44 20 8652 8747 michael.gubisch@flightglobal.com  
**Senior Reporter** Oliver Clark  
+44 20 8652 8534 oliver.clark@flightglobal.com

### AMERICAS

**Americas Managing Editor** Stephen Trimble  
+1 703 836 8052 stephen.trimble@flightglobal.com  
**Deputy Americas Editor - Air Transport** Ghim-Lay Yeo  
+1 703 836 9474 ghimlay.yeo@flightglobal.com  
**Air Transport Reporter** Edward Russell  
+1 703 836 1897 edward.russell@flightglobal.com  
**Air Transport Reporter** Jon Hemmerdinger  
+1 703 836 3084 jon.hemmerdinger@flightglobal.com  
**Aviation Reporter** James Drew  
+1 703 836 7442 james.drew@flightglobal.com

### ASIA/PACIFIC

**Asia Editor** Greg Waldron  
+65 6780 4314 greg.waldron@flightglobal.com  
**Asia Air Transport Editor** Mavis Toh  
+65 6780 4309 mavis.toh@flightglobal.com  
**Asia Finance Editor** Ellis Taylor  
+65 6780 4307 ellis.taylor@flightglobal.com  
**Reporter** Aaron Chong  
+65 6780 4851 aaron.chong@flightglobal.com

### EUROPE/MIDDLE EAST

**Israel Correspondent** Arie Egozi

### FLIGHTGLOBAL.COM

**Editor** Stuart Clarke  
+44 20 8652 3835 stuart.clarke@flightglobal.com  
**Web co-ordinator** Rebecca Springate  
+44 20 8652 4641 rebecca.springate@flightglobal.com

### EDITORIAL PRODUCTION

**Head of Design & Production** Alexis Rendell  
**Global Chief Copy Editor** Lewis Harper  
**Chief Copy Editor, Europe** Dan Bloch  
**Layout Copy Editors** Max Hall, Sophia Huang, Tim Norman  
**Global Production Editor** Louise Murrell  
**Deputy Global Production Editor** Terence Burke  
**Deputy Digital Producer** Damion Diplock  
**Web Production Editor** Andrew Costerton  
**Senior Designer** Lauren Mills  
**Consulting Technical Artist** Tim Hall

### DISPLAY ADVERTISEMENT SALES

**Quadrant House, The Quadrant,  
Sutton, Surrey, SM2 5AS, UK**

### EUROPE

**Global Sales Manager** Mark Hillier  
+44 20 8652 8022 mark.hillier@flightglobal.com  
**Key Account Manager** Grace Hewitt  
+44 20 8652 3469 grace.hewitt@flightglobal.com  
**Sales Support** Gillian Cumming  
+44 20 8652 8837 gillian.cumming@rbi.co.uk

### NORTH & SOUTH AMERICA

**Vice-President, North & South America**  
Rob Hancock +1 703 836 7444  
robert.hancock@flightglobal.com  
**Regional Sales Director**  
Warren McEwan +1 703 836 3719  
warren.mcewan@flightglobal.com  
**Sales Executive** Kaye Woody  
+1 703 836 7445 kaye.woody@flightglobal.com  
Reed Business Information, 333 N. Fairfax Street,  
Suite 301, Alexandria, VA 22314, USA

### ITALY

**Sales Manager** Riccardo Laureri  
+39 (02) 236 2500 media@laurerassociates.it  
Laureri Associates SRL, Via Vallazze 43,  
20131 Milano, Italy

### ISRAEL

**Sales Executive** Asa Talbar +972 77 562 1900  
Fax: +972 77 562 1903 talbar@talbar.co.il  
Talbar Media, 41 HaGiva'a St, PO Box 3184, Givat  
Ada 37808, Israel

### ASIA/AUSTRALASIA

**Key Account Manager** Jay Ee  
+65 6780 4301 jay.ee@flightglobal.com  
Fax: +65 6789 7575  
1 Changi Business Park Crescent,  
#06-01 Plaza 8 @ CBP, Singapore 486025

### RUSSIA & CIS

**Director** Arkady Komarov  
komarov@worldbusinessmedia.ru  
Tel/Fax: +7 (495) 987 3800  
World Business Media, Leninskiy Prospekt, 80,  
Korpus G, Office 807, Moscow 125190, Russia

### CLASSIFIED & RECRUITMENT

**Sales Manager** Sophie Wild  
sophie.wild@rbi.co.uk  
**Recruitment & Classified Key Account**  
**Executive** Katie Mann  
+44 20 8652 4900  
Recruitment.services@rbi.co.uk  
**Recruitment & Classified Sales Executive**  
Stuart Lee +44 20 8652 4900  
Classified.services@rbi.co.uk  
**Key Account Manager - Asia** Jay Ee  
+65 6780 4301

### ADVERTISEMENT PRODUCTION

**Production Manager** Sean Behan  
+44 20 8652 8232 sean.behan@rbi.co.uk  
**Production Manager Classified** Alan Blagrove  
+44 20 8652 4406 alan.blagrove@rbi.co.uk

### MARKETING

**Marketing Director** Justine Gillen  
+44 20 8652 8031 justine.gillen@flightglobal.com

### DATA TEAM

**Head of Data** Pete Webber  
+44 20 8564 6715  
peter.webber@flightglobal.com  
**Commercial Aviation** Steven Phipps  
+44 20 8564 6797  
steven.phipps@flightglobal.com  
**Fleet Research Manager** John Maloney  
+44 20 8564 6704  
john.maloney@flightglobal.com

### PUBLISHING MANAGEMENT

**Chief Operating Officer**  
Philippa Edward  
**Executive Director Content**  
Max Kingsley-Jones  
max.kingsley-jones@flightglobal.com  
**Publisher** Stuart Burgess  
stuart.burgess@flightglobal.com

### READER SERVICES

#### Subscriptions

Jenny Smith  
Flight International  
Subscriptions, Reed Business Information,  
PO Box 302, Haywards Heath,  
West Sussex, RH16 3DH, UK



#### Subscription Enquiries

From UK: 0330 333 9533  
From overseas: +44 1444 475 682  
Fax +44 1444 445301  
flightinternational.subs@quadrantsubs.com

#### Subscription Rates

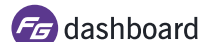
1 Year: £141/\$225/€174  
2 Years: £239.70/\$382.50/€295.80  
3 Years: £338.40/\$540/€417.60  
Only paid subscriptions available. Cheques  
payable to Flight International

Flight International welcomes unsolicited contributions  
from readers but cannot guarantee to return  
photographs safely.

© and Database Rights 2015 Reed Business Information  
Ltd. All rights reserved. No part of this publication may be  
reproduced, stored in a retrieval system or transmitted in  
any form or by any means, electronic, mechanical,  
photocopying, recording or otherwise, without the prior  
permission in writing of the publishers.



Ascend, a Flightglobal  
advisory service, is a leading  
provider of expert advisory  
and valuations services to  
the global aviation industry. Its specialist, independent  
services inform and shape the strategies of aviation  
businesses worldwide. Ascend offers an unrivalled  
breadth and depth of aviation expertise and experience,  
backed by unique access to robust industry data.  
**www.ascendworldwide.com Tel: +44 20 8564 6700**  
**email: consultancy@ascendworldwide.com**



Flightglobal's dashboard is a paid-for news and data  
service for professionals who need to find new  
opportunities or track competition within the air transport  
industry. The service puts a wealth of global intelligence at  
your fingertips, covering everything from airline fleets,  
routes and traffic, through to aircraft finance, industry  
regulation and more. **www.flightglobal.com/dashboard**



Flightglobal Insight provides a range of tailored research  
reports and analysis, with access to information and  
industry expertise from the unrivalled Flightglobal Premium  
services portfolio. **www.flightglobal.com/insight**  
**Tel: +44 20 8652 3914 email: insight@flightglobal.com**

Registered at the Post Office as a newspaper.  
Published by Reed Business Information Ltd, Quadrant  
House, The Quadrant, Sutton, Surrey SM2 5AS, UK.  
Tel: +44 20 8652 3500.

Newstrade distributed by Marketforce (UK), 2nd Floor,  
5 Churchill Place, Canary Wharf, London, E14 5HU, UK.  
Tel: +44 20 3787 9001.

Classified advertising prepress by CCM.  
Printed in Great Britain by William Gibbons and Sons Ltd.

Flight International published weekly 49 issues per year.  
Periodicals postage paid at Rahway, NJ. Postmaster send  
changes to Reed Business Information, c/o Mercury  
International Ltd, 365 Blair Road, Avenel, NJ 07001

This periodical is sold subject to the following conditions:  
namely that it is not, without the written consent of the  
publishers first given, lent, re-sold, hired out or in any  
unauthorised cover by way of trade, or affixed to, or as  
part of, any publication of advertising, literary or pictorial  
matter whatsoever. No part of the content may be stored  
electronically, or reproduced or transmitted in any form  
without the written permission of the Publisher.

ISSN 0015-3710 (Print) ISSN 2059-3864 (Online)

Part of **rbi** reed business  
information



## EVENTS

### 15-17 November

**ALTA Airline Leaders Forum**  
San Juan, Puerto Rico  
alta.aero/airlineleaders/2015

### 17-19 November

**NBAA 2015**  
Las Vegas, USA  
nbaa.org/events/bace/2015

### 17-19 November

**Aerospace & Defense Meetings Torino**  
Turin, Italy  
bciaerospace.com/turin

### 19-20 November

**Safety In African Aviation**  
Kigali, Rwanda  
2gether4safety.org

### 30 November - 2 December

**Expodefensa**  
Bogota, Colombia  
expodefensa.com.co

### 1-2 December

**Military Airlift & Rapid Reaction Ops**  
Seville, Spain  
smi-online.co.uk/defence/europe

### 8-10 December

**Aerospace Meetings Brazil**  
Sao Paulo, Brazil  
bciaerospace.com/brazil

### 21-23 January 2016

**Bahrain International Airshow**  
Bahrain  
bahraininternationalairshow.com

### 3-4 February 2016

**Aircraft Interiors Middle East**  
Dubai World Trade Centre, UAE  
aime.aero/welcome-to-aime-2016

### 16-21 February 2016

**Singapore Air Show**  
Changi Exhibition Centre, Singapore  
singaporeairshow.com

### 17-19 February 2016

**Routes Americas**  
Puerto Rico  
routesonline.com/events/178/  
routes-americas-2016

### 6-8 March 2016

**Routes Asia**  
Manila, Philippines  
routesonline.com/events/180/  
routes-asia-2016

### 26 March - 3 April 2016

**FIDAE**  
Santiago, Chile  
fidae.cl/en

### 5-7 April 2016

**Aircraft Interiors**  
Hamburg, Germany  
aircraftinteriorsexpo.com

### 18-21 April 2016

**Defence Services Asia**  
Putra World Trade Centre, Kuala Lumpur  
dsaexhibition.com

### 2-5 May 2016

**Xponential**  
New Orleans, USA  
xponential.org

### 24-26 May 2016

**EBACE**  
Geneva, Switzerland  
ebace.aero



For a full list of events see  
**flightglobal.com/events**

# CLASSIFIED

**TEL** +44 (0) 20 8652 4897 **FAX** +44 (0) 20 8652 3779 **EMAIL** [classified.services@rbi.co.uk](mailto:classified.services@rbi.co.uk)

Calls may be monitored for training purposes

## New and used aircraft



**Gulfstream®**  
*Independent Authorised Sales Representative for the United Kingdom*

**Tim Leacock**  
AIRCRAFT SALES LIMITED

+44 (0) 1258 818181 [tim@timleacockaircraft.com](mailto:tim@timleacockaircraft.com) [jonathan@timleacockaircraft.com](mailto:jonathan@timleacockaircraft.com) [timleacockaircraft.com](http://timleacockaircraft.com)



**The Regional Aircraft Marketing Specialist**  
Tel. + 44 1753 832088 [info@skyworld.co.uk](mailto:info@skyworld.co.uk)

## Package of ERJ 145 LR's for sale

Fleet of five ERJ 145 LR's for sale, individually or as a package.

- Manufactured 2004
- 'N' registered
- Long range
- Drop down air stair door
- 50 leather seats
- Engine Thrust Reversers
- Engines Rolls Royce TotalCare

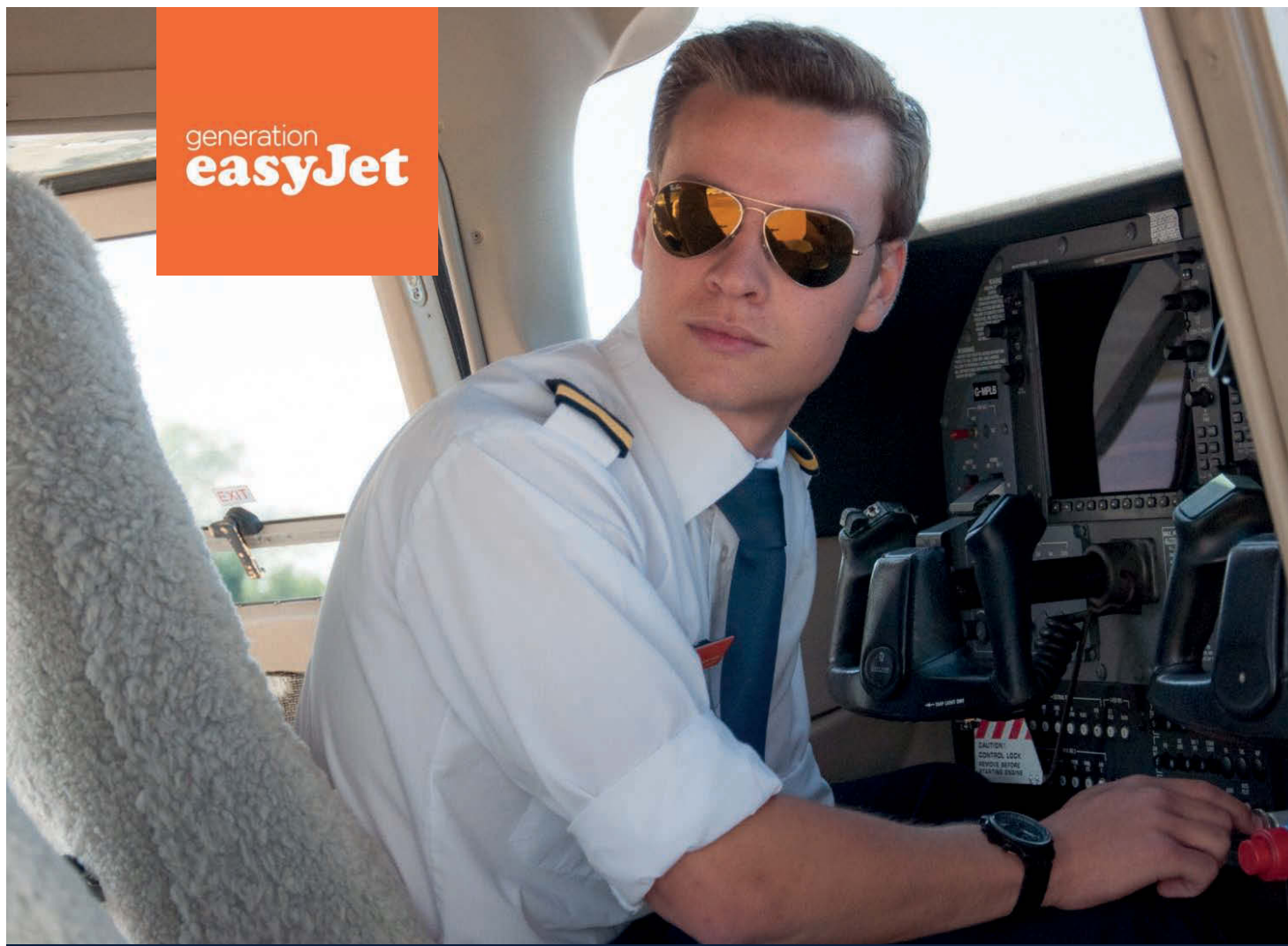
Contact Patrick Leopold  
[patrick@skyworld.co.uk](mailto:patrick@skyworld.co.uk)  
Tel. + 44 1753 832088

[www.skyworld.co.uk](http://www.skyworld.co.uk)



Library picture





# See the world in orange?

CAE Oxford Aviation Academy is looking for enthusiastic people with a genuine passion for flying to apply now for the easyJet mentored pilot training programme. If you have energy, determination and the ultimate goal of joining the fourth largest airline in Europe, then we want to hear from you.

Courses start from April 2016.

Discover more: [www.caeoaa.com/easyJet](http://www.caeoaa.com/easyJet)

+44 (0) 1865 84 1234  
[oxfordacademy@cae.com](mailto:oxfordacademy@cae.com)



## General

## NOTICE OF FORECLOSURE SALE

**NOTICE IS HEREBY GIVEN THAT BY VIRTUE OF CERTAIN EVENTS OF DEFAULT** under that certain Security Agreement, dated as of June 25, 2015 (as amended, supplemented and restated from time to time, the "Security Agreement"), among OJSC "TRANSAERO Airlines", as mortgagor (the "Owner"), AJ Walter Aviation Limited, as lender and secured party for the benefit of the Lenders (as hereinafter defined) ("Secured Party"), and AJ Walter Leasing Ireland Limited, as lender (along with AJW Aviation Limited, the "Lenders"), duly filed and recorded, pursuant to Section 9-610 of the Uniform Commercial Code as adopted under the laws of the State of New York and other applicable law and under the Security Agreement and other related documents, the Secured Party will hold a public foreclosure auction to offer for sale all of the Owner's estate, right, title and interest in and to all assets, properties, and interests pledged by Owner to Secured Party under the Security Agreement, including, without limitation, all of Owner's estate, right, title and interest in and to the following collateral (collectively, the "Collateral"): (i) all aircraft parts and equipment for use with respect to Boeing 737 Classic, Boeing 737 NG, Boeing 777 and Boeing 747-400 aircraft that were pledged as "Collateral" (as defined in the Security Agreement) to the Secured Party under the Security Agreement (collectively, such parts and equipment, the "Parts"), (ii) certain books and records pertaining to the Parts, (iii) all other property, rights and privileges constituting "Collateral" as specified in the granting clause of the Security Agreement; and (iv) all proceeds of the foregoing. **The public auction sale of the Collateral will take place on November 24, 2015 at 2 p.m. (London time) in the offices of Vedder Price LLP, 4 Coleman Street, 6th Floor, London EC2R 5AR, United Kingdom.** Further, for those parties wishing to participate at that public auction sale via teleconference from New York, New York, such parties can so participate at the offices of Vedder Price P.C., 1633 Broadway, 47th Floor, New York, NY on the same date at 9 a.m. (New York time).

**Terms and Conditions of Sale.**

1. The Collateral shall be sold as a whole lot or in multiple partial lots), as determined in the sole discretion of Seller, on an "AS IS, WHERE IS" basis, with all faults, and without recourse to Seller or the Lenders, and Seller and the Lenders make no representations or warranties, express or implied, as to the value, condition, merchantability or fitness for use of any of the Collateral or any other representation or warranty with respect to the Collateral whatsoever. Seller and Lenders do not claim title to the Collateral being sold hereunder and disclaim any warranty of title, possession, quiet enjoyment, value or quality of the Collateral and the like in any sale.

2. The Collateral (or portion thereof) will be sold at public auction to the bidder with the highest or otherwise best bid (as determined by Seller), for cash, except as otherwise provided herein, and on other such commercially reasonable terms as Seller may determine in accordance with Seller's bid procedures (the "Bid Procedures"), a copy of which is available upon request from the representatives listed below.

3. The public auction sale will take place at the time listed above.

4. Seller and Lenders reserve the right to bid at the sale and to credit bid all or any part of the total amount of their secured claims in satisfaction (or partial satisfaction) of the purchase price as set forth in the Bid Procedures. Seller further reserves the right, on or prior to the date of sale, to modify, waive or amend any terms or conditions of any sale or impose any other terms or conditions on any sale and, if Seller deems appropriate, to reject any bids and/or to adjourn, delay or terminate any sale.

5. For a copy of Seller's Bid Procedures, the above-referenced documents or additional information regarding the terms of the sale or the Collateral, or inquiries regarding legal issues, please contact counsel for the Seller and the Lenders, Vedder Price P.C., Attn.: Michael J. Edelman, Esq. (Tel.: +1-212-407-7700) or Cameron Gee, Esq. (Tel.: +1-212-407-6929), 1633 Broadway, 47th Floor, New York, NY 10019, Fax: +1-212-407-7799 or e-mail: MJEdelman@VedderPrice.com or CGee@VedderPrice.com. All bidders and others requesting confidential information relating to the Collateral may be required to sign a confidentiality agreement. No information provided in response to such request shall constitute a representation or warranty.

## Business services

AOG

URGENT

Dauphin parts in stock



alpine.aero  
air support

## Courses and tuition



## THROUGH COMPLIANCE TO PERFORMANCE

Fourth European Aviation Safety Symposium



3 - 4 NOVEMBER 2015 LONDON

## BOOK NOW - VIP SPEAKERS CONFIRMED

Keynote Address **Mr. Kieron McFadyen** Executive Vice President Joint Venture Excellence, Shell

Join the debate and hear industry VIPs discuss why and how they are moving beyond regulatory compliance to safety performance

Find out more and book your places online at [www.bainessimmons.com/symposium](http://www.bainessimmons.com/symposium)

RESERVE YOUR PLACES ONLINE  
**BOOK NOW**



Getting careers off the ground

# flightglobal.com/jobs

EMAIL [recruitment.services@rbi.co.uk](mailto:recruitment.services@rbi.co.uk) CALL +44 (20) 8652 4900 FAX +44 (20) 8652 4877



Flightglobal Jobs

AVIATION CONNECTED

RECRUITMENT



Ansett Aviation Asia is a new simulator training facility located in Taipei City Taiwan. The training centre plans to house 6 full flight simulators, flight training devices, a cabin crew trainer and provide contract Part 142 training to local and regional airlines. A joint venture between the APEX Flight Academy in Taiwan and Ansett Aviation Training will be providing advanced pilot training for cadet pilots and MPL students.

## HEAD OF TRAINING

The applicant should have airline check and training experience on Airbus aircraft, simulator instructional capability with strong management, computer and administration skills. Flight Operational Management experience is desirable.

An appropriate remuneration package will be tailored to attract the right candidate.

**Closing date for applications is**

**Friday 6th November 2015**

**Please e-mail your applications to**

**[applications@ansettaviationasia.com](mailto:applications@ansettaviationasia.com)**

**APEX Flight Academy (Ansett Aviation Asia)**

**9F-1, No. 301, Sec. 2 Tiding Blvd,**

**Neihu Dist. Taipei 11493, Taiwan**

**Ph: +886 (2) 87971686**

### Marshall



### Air Traffic Engineer

Cambridge Airport is situated just minutes away from the City of Cambridge, it operates as a Regional Airport and provides a gateway to Marshall Aerospace and Defence Group business. As part of the ongoing development of the Airport we require an experienced Air Traffic Engineer (ATE).

The ATE will maintain all airport communications, navigation and surveillance equipment.

#### Qualifications Required

- Level 3 ONC/BTEC would be an advantage however consideration will be given to those with relevant experience.
- CAA PTC Group and Type Ratings in compliance with CAP 670 would be an advantage although consideration will be given to those with relevant experience.

#### Experience

Recent engineering experience in an Air Traffic Control environment at civil airports is essential.

Up to £41,000 per annum

### Air Traffic Controllers

As part of the ongoing development of the Airport we require experienced Air Traffic Controllers holding ADI, APP and APS ratings. A Met observer qualification and OJTI endorsement are desirable but not essential.

Candidates are required to hold a Current EU/UK Driving license and a Current European Class 3 ATCO medical certificate.

Experience of providing ATC services in class G airspace is desirable.

Experience of Safety Management System processes is desirable.

Candidates are required to undertake shift work, including weekends; they must have excellent communication skills, a flexible approach, and must have the ability to operate safely and effectively both on their own initiative and as part of a small and friendly team.

£51,000 rising to £60,000 upon validation of all three ratings

[execsearch@aeropeople.com](mailto:execsearch@aeropeople.com) & [www.aeropeople.com](http://www.aeropeople.com)



TIME FOR  
YOUR CAREER  
TO TAKE FLIGHT

Start your job search today  
[flightglobal.com/jobs](http://flightglobal.com/jobs)



## online aviation training

from an EASA Part 147 training organisation

- EWIS • human factors • fuel tank safety
- ETOPS • part 145 & M • dangerous goods
- safety management systems

[att@resourcegroup.co.uk](mailto:att@resourcegroup.co.uk)

[www.resourcegroup.co.uk/att](http://www.resourcegroup.co.uk/att)

**+44 (0) 1285 772 690**



# RECRUITMENT ADVERTISEMENT FOR CIVIL SERVICE VACANCY

## CIVIL AVIATION DEPARTMENT, GOVERNMENT OF HONG KONG SPECIAL ADMINISTRATIVE REGION

### Senior Operations Officer (Helicopter Operations Inspector)

**Salary:** Master Pay Scale Point 45 (HK\$101,620 approximately US\$13,028\* per month) to Master Pay Scale Point 49 (HK\$117,080 approximately US\$15,101\* per month) (See Note 1). (\*Based on exchange rate of HK\$7.8 = US\$1) (subject to fluctuation)

**Entry Requirements:** Candidates should have (a) (i) a current Airline Transport Pilot's Licence (ATPL) (Helicopters) with Class One Medical Certificate and not less than 3,000 flying hours in command of helicopters of which 2,000 hours should be in command of twin-engine helicopters; and (ii) not less than 12 years' relevant post-licence experience of which not less than five years should be as an Aircraft Rating and Instrument Rating Examiner or in other regulatory duties; **OR** (b) an International Civil Aviation Organization (ICAO) contracting state's Commercial Pilot's Licence (CPL) (Helicopter) with Instrument Rating; and a minimum of seven years' post-licence experience in civil aviation management and operations or as a regulator; and have passed the ATPL examinations; **AND** (c) strong command of written and spoken English.

#### Notes:

- (1) Subject to the prevailing situation, candidates with additional experience may be granted increments for previous relevant experience in the civil aviation field in excess of the stipulated minimum. Please note that applications from the serving civil service Senior Operations Officer (Helicopter Operations Inspector) in the Civil Aviation Department would not normally be considered.
- (2) For the purpose of heightening public awareness of the Basic Law (BL) and promoting a culture of learning of BL in the community, assessment of BL knowledge will be included in the recruitment for all civil service jobs. Results of the BL test for degree/professional grades will be one of the considerations to assess the suitability of a candidate but will not affect his/her eligibility for applying for civil service jobs. As a general principle, the main consideration for suitability for appointment remains a candidate's qualification, experience and caliber.
- (3) Candidates should submit their application forms together with an **Experience Resume** by mail to the enquiry address on or before the closing date for application. The Experience Resume can be downloaded from the Civil Aviation Department's website. (<http://www.cad.gov.hk/english/recruitment.html>)

**Duties:** A Senior Operations Officer (Helicopter Operations Inspector) is mainly deployed on helicopter operations matters including - (a) monitoring of the operating standards of helicopter operators in Hong Kong; (b) monitoring standards of crew training and associated training facilities, operations and training manuals, pre-flight briefings, flight planning facilities and the adequacy of staffing and accommodation; (c) observation of tests conducted by operators' examiners for the issue/renewal of authority to sign certificate of test and type rating tests forms; (d) investigation of aircraft accidents and incidents; and (e) assisting in formulation of policies and requirements on flight standards and operations matters. (Notes: Post holders are required to travel extensively on duty and work irregular hours.)

**Terms of Appointment:** A new recruit will normally be appointed on civil service agreement terms for three years. A gratuity may be granted upon satisfactory completion of the contract with consistently high standard of performance and conduct. The amount of gratuity payable will be the sum which, when added to the Government's contribution to the Mandatory Provident Fund Schemes, equals to 15% of the total basic salary drawn during the contract period. He/she will be required to serve on agreement terms for at least 3 years before they can be considered for appointment on the prevailing permanent terms.

**Enquiry Address, Fax, No. and E-mail Address:** For enquiry or request for an application form, please write to the Assistant Departmental Secretary (Personnel) 2 of Administration Division, Civil Aviation Department, Level 5, Civil Aviation Department Headquarters, 1 Tung Fai Road, Hong Kong International Airport, Hong Kong S.A.R., People's Republic of China. (Fax: (852) 2910 6399) or e-mail to [recruitment@cad.gov.hk](mailto:recruitment@cad.gov.hk) quoting reference "CAD PR/5-25/64(2015)".

**Closing Date of Application:** 23rd November 2015

#### General Notes:

- (a) Persons who are not permanent residents of the Hong Kong Special Administrative Region (HKSAR) may also apply for this vacancy but will be appointed only when no suitable and qualified candidates who are permanent residents of the HKSAR are available.
- (b) As an Equal Opportunities Employer, the Government is committed to eliminating discrimination in employment. The vacancy advertised is open to all applicants meeting the basic entry requirement irrespective of their disability, sex, marital status, pregnancy, age, family status, sexual orientation and race.
- (c) Civil service vacancies are posts on the civil service establishment. Candidates selected for these vacancies will be appointed on civil service terms of appointment and conditions of service and will become civil servants on appointment.
- (d) The entry pay, terms of appointment and conditions of service to be offered are subject to the provisions prevailing at the time the offer of appointment is made.
- (e) The information on the maximum pay point is for reference only and may be subject to changes.
- (f) Fringe benefits include paid leave, medical and dental benefits, and where appropriate, assistance in housing.
- (g) Where a large number of candidates meet the specified entry requirements, the recruiting department may devise shortlisting criteria to select the better qualified candidates for further processing. In these circumstances, only shortlisted candidates will be invited to attend recruitment examination and/or interview.
- (h) It is Government policy to place people with a disability in appropriate jobs wherever possible. If a disabled candidate meets the entry requirements, he/she will be invited to attend the selection interview/written examination without being subject to further shortlisting.
- (i) Holders of academic qualifications other than those obtained from Hong Kong institutions/Hong Kong Examinations and Assessment Authority may also apply but their qualifications will be subject to assessments on equivalence with the required entry qualifications. They should submit copies of their official transcripts and certificates by mail to the above address.
- (j) Civil service vacancies information contained in this column is also available on the GovHK on the Internet at [www.gov.hk](http://www.gov.hk).
- (k) Towards the application deadline, our on-line system would likely be overloaded due to large volume of applications. To ensure timely completion of your on-line application, it is advisable to submit the application as early as possible.

**How To Apply:** Application Forms [G.F. 340 (Rev. 3/2013)] can be downloaded from the Civil Service Bureau's website (<http://www.csb.gov.hk>). **Candidates must state clearly the details of professional qualification obtained on the application forms and attach the Experience Resume.** (See Note 3) Completed forms, together with the Experience Resume, should reach the above enquiry address of the recruiting department on or before the closing date for application. Please specify the title of the post being applied for on the envelop. Online application can also be made through the Civil Service Bureau's website (<http://www.csb.gov.hk>). Candidates who apply online should submit the **Experience Resume within one week after close of application period** to the above enquiry address, and the online application number should be quoted on the envelopes and the Experience Resume. **If candidates fail to provide the Experience Resume as requested by the deadline, their applications may not be considered.** Applicants are encouraged to provide their email addresses on the application forms. Candidates who are selected for interview will normally receive an invitation (by email or by post) in about six to eight weeks from the closing date for application. Those who are not invited for interview may assume that their applications are unsuccessful. For enquiries, please contact the department via the means stated above.



A photograph of a Jet2.com aircraft on a tarmac. The foreground shows the red nose and wing of a plane with 'Jet2.com Friendly Low Fares' written on it. In the background, another Jet2.com aircraft is visible, also with the company name and '22kg baggage' written on its side. The sky is clear and blue.

**Jet2.com**  
Friendly low fares®

**Now Recruiting!**

# ***B737 & B757 Type Rated and Non Type Rated Captains and First Officers***

**Jet2.com** is the North's leading leisure airline operating a fleet of **B737 - 800s & 300s** and **B757 - 200s**. As we continue to grow, we are recruiting Type Rated and Non Type Rated Captains and First Officers to join our Team.

## **What we offer you:**

- ➔ **Industry-leading Training at our Flight Training Centre**
- ➔ **3 Full Flight Simulators**
- ➔ **Short-haul flying**
- ➔ **Great Team spirit**
- ➔ **Career Progression**

We have vacancies at **Belfast, Edinburgh, Glasgow, Newcastle, Leeds, Manchester** and **East Midlands** and at our overseas base in **Alicante**.

In return, we offer a **competitive salary** and **excellent benefits** along with **great career opportunities** in our exciting business.

If you are **flexible** and **adaptable** you will enjoy our interesting flying.

**Interested? Apply online at [Jet2careers.com](http://Jet2careers.com)**

## Flight crew

## Flight Crew Services



- Commercial & VIP Recruitment
- Management Recruitment
- Temporary & Permanent
- Payroll

flight@resourcegroup.co.uk  
+44 (0) 1256 368 500  
www.resourcegroup.co.uk/fcs

## Flight crew

## RECRUITMENT FOR THE AVIATION INDUSTRY



## AVIATION SERVICES

Tel: +353 1 669 8224  
Fax: +353 1 669 8201

Email: recruitment@sigmaaviationservices.com  
www.sigmaaviationservices.com

## Maintenance

## Aviation Resourcing Services



- Maintenance Personnel
- Production Personnel
- Temporary & Permanent
- Global Reach

flight@resourcegroup.co.uk  
+44 (0) 1638 672 880  
www.resourcegroup.co.uk/ars

## Engineering



Worldwide specialist for Aerospace Engineering, Certification & Management Services  
E: yourcv@gdcengineering.com  
T: +49 (0) 8153 93130  
W: www.gdcengineering.com



Talk to us for the most exciting  
Expat Pilot Jobs in INDIA

jobs@proctoraviation.com  
www.proctoraviation.com  
+91 22 6120 4400

AeroProfessional  
Aviation People Experts

- ▶ Recruitment ▶ Skills Insights
- ▶ Compliance ▶ Flight Ops Support

www.aeroprofessional.com

## Engineering



The preferred company for Stress (Fatigue & DT), GFEM, Composites, Aeronautical Research. Business units: Contract staff, Workpackages, Innovation and New Concepts, Aeronautical Research. www.bishop-gmbh.com  
Contact bishop.peter@bishop-gmbh.com  
Tel 0049-(0)40-866-258-10 Fax 0049-(0)40-866-258-20

## Maintenance



Call: +44 (0)1524 381 544  
Email: info@safehand.aero  
www.safehand.aero

you're in safe hands with us

Aviation Strongfield

Strongfield Specialist Aerospace Personnel

+44 (0)20 8799 8924 amedhurst@strongfieldtech.com  
www.strongfield.com

## Technical Recruitment Solutions



- Product & System Design
- Project Management
- Manufacturing & Supply Chain
- Engineering & Engineering Management

trs@resourcegroup.co.uk  
+44 (0) 1905 368 576  
www.resourcegroup.co.uk/trs

Start your job search today  
flightglobal.com/jobs



# Let your recruitment drive soar...

post your vacancies now  
recruiters.flightglobal.com

AVIATION | AIRLINES | AEROSPACE



"Finding the right candidate at the right time can be a major challenge, but Flightglobal Jobs is a really useful channel to reach the best of the aviation talent pool."

European Business Aviation Association (EBAA)





WORK EXPERIENCE MICHAEL GRÜNINGER

# Teenage dream becomes reality

Michael Grüninger fell in love with aviation as a boy in Switzerland, but it was a chance encounter with a Cessna Cardinal in Cairo that propelled the founder of safety consultancy Great Circle Services to a career in flight

## How did you get into aviation?

As a boy and teenager I lived in a house overlooking St Gallen Altenrhein airport. I saw airplanes taking-off, overflying and landing all the time. I was fascinated. My uncle was a pilot, and although we only went flying together once, I still remember the ride.

My professional path, though, did not lead me directly to my teenage love. I studied philosophy and theology, then worked as a teacher. During that time I became a sailplane pilot. I went to Cairo, Egypt, worked as a radio journalist and flew motor gliders. One day, an N-registered Cessna 177B landed there and, through a series of events, I ended up buying the Cardinal even though I didn't hold the appropriate licence! However, I completed my US private pilot's license instrument rating in Sacramento, so in Egypt I was able to fly around the pyramids and across the Nile. I kept this aircraft even when I was back in Switzerland.

Slowly I progressed to the commercial pilot's licence and, in 1998, I went to night school to do my air transport pilot's licence theory. Farnair in Switzerland hired me as a co-pilot, dispatcher and station manager in Sarajevo, and not long after I became a flight inspector for Switzerland's national aviation authority.

## What attracted you about the safety and regulatory side?

The history of ideas and the practice of good judgment had always caught my attention – applying well-developed mental models to aviation was a natural move. Safe-



Michael Grüninger at the AfBAA annual symposium, September 2015

**“In 2005, I promoted the concept of safety culture. Now this has been widely received in the industry”**

ty thus became a concept around which I felt attracted to work.

Having served as a professional pilot, the next step was to join an aviation authority. I have gained valuable experience from working on both sides of the industry. I understand the logic of the operator and the logic of the regulator. Once, during a SAFA [safety assessment of foreign aircraft] inspection in Geneva, the airline representative, facing a technical

problem causing a major delay, said: “We need a lawyer.” I answered: “You don't need a lawyer, you need a mechanic.” The practical side is equally important, and that is what attracts me. I set up Great Circle Services in 2005 to focus on this aspect.

## What does your average working week look like?

I work for very different organisations – one day I'm teaching, the next writing manuals, the next offering consultancy to a client.

What I like most is supporting a client in setting up an efficient organisation within the constraints of safety objectives and regulatory compliance. Traveling makes up a big portion of my week. My customer base is worldwide.

## What are your biggest challenges?

The way organisations change and how they are perceived. In 2005, I promoted the concept of safety culture. Now this has been widely received in the industry. I focus more on the practicalities of realistic, fact-based decision-making in airlines and maintenance, repair and overhaul companies. Then there's staying on top of regulations, development of management systems and staying competitive in the commercial field of aviation-safety consulting.

## How do you see regulations changing in the future?

More regulators are moving to performance-based rulemaking. It is now imperative to address cultural and human factors too. Learning from psychology, anthropology and sociology can be used to determine how an organisation and individuals behave under certain conditions. Safety is a matter of technical and operational excellence, but increasingly a matter of organisational and individual development. If this observation is correct, it might be more challenging for regulators and operators to find global “common sense”. ■



Looking for a job in aerospace? Check out our listings online at [flightglobal.com/jobs](http://flightglobal.com/jobs)

If you would like to feature in Working Week, or you know someone who does, email your pitch to [kate.sarsfield@flightglobal.com](mailto:kate.sarsfield@flightglobal.com)



TIME FOR  
YOUR CAREER  
TO TAKE FLIGHT

Start your job search today  
[flightglobal.com/jobs](http://flightglobal.com/jobs)

AVIATION | AIRLINES | AEROSPACE

**Flightglobal**  
Jobs

# We create chemistry that makes high flyers love low costs.



BASF is a leading supplier of fuel performance packages worldwide. Kerojet® aviation fuel additives can help reduce the costs of maintenance, improve efficiency and sustain the high performance of aviation gas turbines. Our additives improve the environmental footprint for the airlines, reduce waste and improve the health and safety for maintenance crews: BASF's aviation fuel additives offer the potential to reduce the need for expensive and time consuming tank draining procedures, biocide treatments and can reduce the risk of ice forming in the fuel systems of aircrafts. In a nutshell: Kerojet® solutions save airlines time and money.

When high flyers love low costs, that's because at BASF, we create chemistry.  
Contact us: [jetfuel-additives@basf.com](mailto:jetfuel-additives@basf.com)

Visit us: [www.basf.com/fuel-lubricant-solutions](http://www.basf.com/fuel-lubricant-solutions)

 **BASF**

The Chemical Company